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PROCEEDINGS OF THE MISSISSIPPI PUBLIC MEETING, NATIONAL ESTUARINE POLLUTION STUDY, SPONSORED BY THE FEDERAL WATER POLLUTION CONTROL ADMINISTRATION HELD AT BROADWATER BEACH HOTEL, BILOXI, MISSISSIPPI ON JANUARY 17, 1968

Federal Water Pollution Control Administration
Atlanta, Georgia

17 January 1968

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PROCEEDINGS

of the

MISSISSIPPI PUBLIC MEETING
-
NATIONAL ESTUARINE POLLUTION STUDY

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

January 17, 1968

Broadwater Beach Hotel
Biloxi, Mississippi

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242

TABLE OF CONTENTS

WEDNESDAY MORNING SESSION, January 17, 1968

Call to Order, Mr. John R. Thoman 1

Invocation, Mr. Thoman 1

Opening Remarks and Introductions, Mr. Thoman 1

Statements and Presentations:

Letter from United States Congressman William M. Colmer, Read by Mr. Eugene T. Jensen 4

Letter from Mississippi Senator Nap L. Cassibry, Read by Mr. Paul J. Traina 4

Statement from Gulfport Area Chamber of Commerce Secretary-Manager Sam K. Williams, Read by Mr. Glenn Wood ... 5

Executive Director Jack Different, Gulf Regional Planning Commission 6

- Discussion 8

Dr. Walter Abbott, Gulf Coast Research Laboratory 8

- Discussion 12

Mr. Dudley B. Heiliger, Mississippi Outdoor Writers Association 14

Mr. James Leker, Air and Water Quality Committee, Mississippi Manufacturers Association 17

- Discussion 17

Mr. Joseph P. Glasscock, Harrison County Development Commission 19

Statement from Director John A. Martiniere, Biloxi Port Commission, Read by Mr. Thoman 20

Mr. Jeff W. Napier, Outboard Boating Club of America 22

- Discussion 28

Mr. Louis Fondren, Mississippi Gulf Coast Seafood Association 30

- Discussion 30

TABLE OF CONTENTS (Cont'd)

Mississippi AFL - CIO President Claude Ramsey 34

Discussion 38

Mr. Murry Lucky, Supervisor of Production, Mississippi Power Company 40

Discussion 41

Statement of Mr. James M. Sharp, Read by Mr. Traina 44

Dr. James V. Walters, International Paper Company 45

Mr. Joseph V. Colson, Gulf-States Marine Fisheries Commission 46

Discussion 47

Dr. Lloyd R. Robinson, Jr., Mississippi State University 48

Dr. George A. Rounsefell, University of Alabama Marine Sciences Institute 48

Mr. George W. Allen 49

Summary Statement, Mr. Thoman 50

Closing Remarks, Mr. Wood 51

Adjournment 51

- - -

APPENDIX I -- Report of the Pollution Study Committee, National Association of State Boating Law Administrators

APPENDIX II - Plat, Oyster Tonging and Handling Regulations

- - -

(NOTE: This record remains open for inclusion of any statements submitted within 15 days of the foregoing hearing.)

APPENDIX III - Statement(s)

APPENDIX X -- List of Invitees to meeting

APPENDIX Y -- List of Federal agencies advised of meeting including sample letter

TABLE OF CONTENTS (Cont'd)

APPENDIX Z -- List of State Agencies advised of meeting including sample letter

APPENDIX Z -- List of meeting registrants
List of General Interest Group
Invitees & sample letter

ATTACHMENTS.

PUBLIC MEETING

NATIONAL ESTUARINE POLLUTION STUDY

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

Broadwater Beach Hotel   Biloxi, Mississippi

January 17, 1968

WEDNESDAY MORNING SESSION

- - -

The public meeting directed toward obtaining contributions from Mississippi interest regarding the National Estuarine Pollution Study being conducted by the Federal Water Pollution Control Administration convened in the Coronet Room of the Broadwater Beach Hotel, Wednesday morning, January 17, 1968, and was called to order at 9:00 o'clock a.m. by Regional Director John R. Thoman, Southeast Region, Water Pollution Control Administration.

MR. JOHN R. THOMAN: Ladies and gentlemen, it's about 9:00 o'clock, and we would like to try to be punctual.

First of all, if everyone would stand up for a short invocation, please. This prayer, incidentally, is from the Byzantine Rite Mass in a Catholic church. It's a very old prayer.

Oh Lord, Who dost bless them who bless Thee, and dost sanctify them who trust in Thee, save this people and bless Thine inheritance.

Give peace to Thy world, to Thy churches, to Your government, to our armed forces, and to all Thy people; for every good and perfect gift is from above and comes down from Thee, oh Father, and to Thee do we render glory, thanksgiving and worship now and always and forever and ever. Amen.

My name is John R. Thoman. I am regional director of the Federal Water Pollution Control Administration in Atlanta, Georgia.

This meeting today is being held in connection with the National Estuarine Pollution Study, which is authorized under the Clean Water Restoration Act of 1966.

This act directs the Department of the Interior to make a comprehensive study of pollution problems in the nation's estuarine areas and to report to the Congress recommendations for a future management program.

Congress has directed that the study be completed by November, 1969. We are consulting directly with our sister federal agencies.

In Mississippi, Mr. Robert S. Wright, Executive Secretary of the Air and Water Pollution Control Commission, has been appointed by the Governor to represent the state's interest.

Through his office, we are obtaining the use of Mississippi's executive agencies regarding estuarine utilization and management. As a consequence, neither views from any of the other federal agencies nor any of the official state agencies will be presented here this morning.

Mr. Wright, unfortunately, has an extremely ill family. As he told me yesterday, he is the only walking member of the family and is unable to be with us today.

He is represented by Mr. Glenn Wood, sanitary engineer to the staff of the Air and Water Pollution Control Commission.

In addition to government agencies, we have been directed by the Congress to obtain the views and the opinions of the many local public and private groups, institutions, organizations and individuals who comprise the users of estuarine water.

Through public meetings such as this one--and incidentally, this is the first one in the country--we are obtaining their views and recommendations to be included in the report to Congress.

Interests in estuaries are many and diverse. The commercial fisherman depends greatly on them for his livelihood. The sports fisherman looks for a rewarding catch.

The boater and swimmer expect clean water for recreation, as do the camper and outdoorsman. And all of us look to them as sources of power and water courses for navigation and trade.

Each has a very legitimate interest. Yet, unfortunately, some of these interests will not always be compatible with the interests of other groups.

Frequently, in fact, too often, where one use has been recognized and exploited, others have been ignored or destroyed.

What is needed is information to determine the various beneficial uses of estuaries and their interrelationships and then plan for these uses to meet the maximum public good.

Here in Mississippi there are approximately 360 miles of tidal shoreline used for fishing, recreation, industry, navigation and other purposes. Recreation is provided for countless persons from Deer Island to Pass Christian.

This area provides and supports a healthy tourist economy. In the eastern part of Mississippi, dynamic industrial complexes are rapidly expanding along the coast.

Mississippi has long been a producer of excellent shellfish. So it is apparent that if estuaries are to continue to thrive and serve the best interests of all concerned, wise planning is essential.

These public meetings are a forward step toward this end. They are not our meetings, but yours. We are here to listen and to learn. What you say is important, because it will become a part of the report to Congress.

And more significantly, it will contribute to the development of a national policy on estuarian management. This is your opportunity to be heard.

While we have suggested that statements be submitted in writing in advance of the meeting, we welcome any statements which you may wish to submit at this time, either written or oral.

The meeting record, which is being taken today by Mr. Tom Crites, will be held open for 15 days following today to receive any statements that any of you may wish to present but do not have the opportunity to do so today, or do not have them prepared.

I want to introduce the panel that is here. This is not a hearing board. It is a group of people of various expertise whom we have gathered together to ask questions of those who will speak today, not in an interrogatory sense, but merely to elicit additional information that might be, or not be, presented in your statements, and to obtain views that we may feel are somewhat important.

First is Mr. John Wakefield, who is in charge of comprehensive management in the regional office of FWPCA. Mr. Wakefield is a native of Florida. He is the former director of the Division of Water Resources of the State of Florida Board of Conservation.

After some 30 or 35 years of experience in the field of water resources management and sanitary engineering, we feel that he is eminently qualified to serve as a member of this group.

The next person, of course, is Mr. Glenn Wood, representing the Mississippi Water and Air Pollution Control Commission.

Paul Traina is the Director of Technical Services at the Southeast Water Laboratory in Athens, Georgia. He is a native of New York. He has spent most of his professional career in the South and Southwest.

The next individual is Mr. Gene Jensen. Mr. Jensen is in charge of this National Estuarine Study in the Washington headquarters. He is a former commissioned officer of the United States Public Health Service, for the last 15 years of which he directed the shellfish program of the Public Health Service Department.

He is extremely knowledgeable in the field of estuaries. He is internationally known for his work in protecting shellfish from contamination. Mr. Jensen resigned as a commissioned officer of the Public Health Service Department and joined the Federal Water Pollution Control Administration Study about a year ago.

At this time, Mr. Jensen has a statement from Congressman William Colmer of Pascagoula, which he would like to read.

MR. EUGENE T. JENSEN: As many of you know, the President will deliver the State of the Union message tonight, and Congressman Colmer felt it was important for him to be in Washington, so I will read this letter to you.

It is addressed to me. It reads as follows:

"Thank you for this opportunity to make this comment at the Public Meeting to discuss estuarine preservation and development problems.

"Having lived near or on the Gulf all of my life and knowing of the values of the estuaries of Mississippi, I am most concerned with both the development and the conservation of these areas to bring to full realization their potential benefits for the people of this State.

"You may certainly be assured of my deep interest in the work of the National Estuarine Pollution Study. I am gratified that the Mississippi Gulf Coast was chosen as the site of the first of a series of public meetings to explore estuarine problems.

"I shall look forward to receiving a copy of the proceedings for this January 17 meeting and such recommendations for development of this part of the State of Mississippi as they become available in the future.

"With best wishes for a most successful meeting, I am sincerely yours."

MR. THOMAN: Thank you, Gene. The next statement was to be delivered by Senator Nap L. Cassibry, member of the Mississippi Senate, from the city of Gulfport, but he is unable to be here this morning.

He has submitted a letter, which Mr. Traina will now read.

MR. PAUL J. TRAINA: This letter is addressed to the Director of Technical Programs, Southeast Water Laboratory, Federal Water Pollution Control Administration. It reads as follows:

"Mr. Chariman: I intend to make only a brief statement as an interested individual with regard to this hearing. While the State of Missisippi is blessed with a short coastline, it is blessed with an abundance of natural renewable marine resources in the form of fish, crab, shrimp and oysters which bring in a sales income of Sixteen Million Dollars ($16,000,000.00) annually to the State.

"I am deeply concerned with preserving and maintaining the coastal waters of our State in as near to pristine conditions as possible so that the people of our fine sovereign State will continue to enjoy the bountiful harvest from its waters and also enjoy the many forms of recreation that these waters provide.

"Mississippi has been and is continuously moving to assume the responsibility of pollution control within its boundaries and cooperating with its neighboring States in order to maintain clean water conditions.

"Recently, by an Act of the Mississippi Legislature, an Air and Water Pollution Control Commission was established to handle the various pollution problems within the State. I feel that this body along with the competent scientific personnel in the State can handle any situation which might arise without any federal interference or intervention. At best, pollution problems are difficult enough to handle when you are dealing with factors that are known. A few years ago, the U. S. Public Health Service set up a standard on oysters which is being applied to all oystering areas in the United States. I understand that the organism that is used as an indicator of contamination from human sources is not harmful though not entirely indigenous to the human intestinal tract. I am fearful of the consequences which might result from any other standards imposed which have not been worked out to apply to our warm coastal waters. The aforementioned remark is all the more reason why I think that these problems should be handled on a local level.

"Lastly, I would like to say that I am deeply concerned with the rapidity with which the Federal government is projecting itself into situations which can be handled entirely by this State.

"Thank you for the opportunity to voice my opinion at this hearing. Nap L. Cassibry, State Senator, District 35, Harrison County, Mississippi."

MR. THOMAN: And we have one more statement from the front table, and then we will turn the meeting over to you.

Mr. Wood has been requested by Mr. Sam K. Williams, secretary-manager of the Gulfport Area Chamber of Commerce to present his statement at this particular time. Mr. Wood.

MR. GLENN WOOD:

"The following resolution was passed by the Board of Directors of the Gulfport area Chamber of Commerce at its regular meeting January 8, 1968, at 4:00 P.M.:

"On motion duly made, seconded, and unanimously carried, IT WAS RESOLVED that the representatives of the Board of Directors of the Gulfport area Chamber of Commerce attending the water resources meeting held by the Department of Interior January 17, 1968 at Broadwater Beach Hotel, be and they are hereby requested to convey to the Department of Interior that it is the sense and feeling of this Board of Directors that it would be to the best interest of all concerned, and the people of the State of Mississippi in particular, that all regulations pertaining to water and air uses in Mississippi and all directives and regulations promulgated by the Department of Interior relating to water and air uses in Mississippi be issued only after consultation with the Mississippi Commission on water and air uses and that the policing and enforcement of such regulations and directives within the geographic limits of the State of Mississippi be left to the said Mississippi Agency in the interest of the orderly and uniform administration thereof. Sam K. Williams, Secretary-Manager, Gulfport Area Chamber of Commerce."

MR. THOMAN: Thank you, Glenn. At this particular time, I would like to make note of the fact that statements from the Girl Scouts of the United States of America, represented by Region 5, branch office in Memphis, Tennessee, will be inserted in the record and a letter and supporting documents from Dr. Troy C. Doris, director of the Oklahoma State University, acting in his capacity as secretary of the Ecological Society of America, will also be inserted in the record.

We also note from Governor Williams' inaugural speech yesterday that he intends to submit specific legislative recommendations to the Mississippi State Legislature -- among other things, concerning conservation, oceanography study and exploration.

With that, we will turn the meeting over to you. And first of all, I would like to call on Mr. Jack Different, executive director of the Gulf Regional Planning Commission in Bay St. Louis, Mississippi. Mr. Different.

MR. JACK DIFFERENT: The Gulf Regional Planning Commission has been established pursuant to the provisions of House Bill Number 393, Mississippi Legislature, 1964.

Enabling legislation declares that the commission shall serve in an advisory capacity to the governing authority of participating jurisdictions, preparing and making recommendations upon comprehensive long-range development plans, water supply, sewage collection, treatment and disposition, public recreation, public buildings, acquisition and disposition of public lands, regulations for control of land uses, and certain other appropriate matters.

Presently participating in the programs of the commission are the Mississippi Counties of Hancock, Harrison, Jackson and Pearl River.

The Gulf Regional Planning Commission has initiated a series of activities which constitute the essential basis for a long-range comprehensive plan for the region.

These include the preparation of current, standardized base maps, population and economic base studies, and an existing land-use analysis. An urban area transportation study is expected to be begun shortly.

Following completion of these basic studies, there will be detailed studies, there will be detailed studies of, for example, tourism and recreation potential, industrial development feasibility study, and public utilities.

The commission has formally stated its intention to undertake studies of water resources, necessarily including pollution abatement and recommended measures therefor.

The planning region contains four readily identifiable estuarine zones:

a. Pascagoula River, with a drainage basin which contains densely developed urban areas, industrial concentrations and extensive marsh areas.

b. Biloxi Bay, surrounded for much of its length by urban development, a planned industrial area and a major steam-generating electric power station.

c. Bay of St. Louis, also flanked in part by urban development, only limited areas of which are adequately served by sanitary sewage collection, treatment and disposition systems.

d. Pearl River, a major stream with a number of urban centers and industrial installations of its middle reaches.

Comprehensive, well-coordinated programs have been initiated on the Pascagoula and Pearl River systems which will provide significant benefits in quality control.

Only limited local programs for pollution control have been initiated for Biloxi Bay and the Bay of St. Louis, primarily municipal in scope.

The Gulf Regional Planning Commission is vitally concerned with the degrading effects of continued estuarine pollution. Principal among these are:

a. Commercial fisheries, including shellfish. Existing levels of pollution are already having a depressing effect upon the industry, necessitating consideration of the relocation of formerly productive oyster beds. Spokesmen for other agencies and interests are in a position to comment upon the economic effects should additional productive areas become contaminated to a point unfit for human consumption.

b. Recreation, including pleasure boating, swimming, hunting, and noncommercial fishing. With respect to the latter, attention is called to the increased popularity of the region as a retirement home area, with an attendant increase in the number of retirees who fish both for pleasure and as a supplemental source of food for family consumption.

c. Aesthetically, increasing levels of estuarine pollution create a displeasing situation which, if not corrected, will militate against the natural attractiveness of the area for all of the activities referred to above. Such a situation will ultimately deprive the region of an important asset and significantly increase the potential for full development of tourist and recreation attractions and facilities.

The commission is not presently in a position to speak with authority on the economic importance and/or impact of the activities mentioned; there are certain to be others in attendance who can do so.

The commission is, however, concerned with the total development of the region and is committed to cooperate with appropriate local, state and federal agencies and private interests in accomplishment of a level of development offering the maximum range of choice while protecting the major public interests of all the inhabitants. Thank you.

MR. THOMAN: Have you given any thought, or has your commission given any thought, to what the proper role should be of federal, state, local, regional commissions such as yours in solving the problems in these estuaries?

MR. DIFFERENT: We viewed the role of our commission as a study and advisory group. We will have no enforcement power. We will recommend to local agencies within our jurisdiction measures which should be taken.

We will arrive at those recommendations by cooperating fully with studies such as are being probed here.

MR. JOHN WAKEFIELD: I would like to ask if your commission has developed a site plan for municipal treatment work.

MR. DIFFERENT: No, sir, not yet.

MR. WAKEFIELD: You will do this?

MR. DIFFERENT: Yes.

MR. JENSEN: Has your commission directed any of its planning activities to such things as dredging -- land development around estuaries?

MR. DIFFERENT: Not yet. Let me explain our position, sir. We have been in existence slightly more than two years. During that time, we spent one year on the preparation of a work program, which we call the study.

We have just now initiated, as of December 11th, the basic studies. These are the first steps toward kinds of plans to which we refer. These will come in later periods.

MR. THOMAN: Thank you very much, Mr. Different. I certainly wish you every success with your commission, and if we can cooperate at any time, we will be more than happy to do so.

The next indication I have here is someone from the Gulf Coast Research Center would wish to present a statement. I do not have your name. Would you please identify yourself, sir.

DR. WALTER ABBOTT: My name is Walter Abbott. This statement is presented on behalf of the Gulf Coast Research Laboratory in Mississippi. Mr. Demoran is in the audience, and he has some extra copies for distribution, if anyone is interested.

By and large, the estuaries of the Gulf Coast are intrastate bodies of water. Hence, the basis for federal intervention in the use and management of these estuaries is not clear, and we are not aware of the issuance of any invitations.

The whole question of pollution in Gulf Coast estuaries can only be regarded as indeterminate at the present time. There are, to be sure, some restricted estuarine areas which exhibit gross pollution, such as certain ship channels and industrialized waterways, and aesthetic objections may be raised to these.

We submit, however, that these areas offered very little of aesthetic value prior to their urbanization, industrialization and pollution, and that their best use from the standpoint of the economics of the areas involved is probably as open sewers and navigable channels.

This is particularly true since no process, including waste treatment, is 100-percent effective. With increasing population and increasing industrialization, a slow but steady growth of pollution is inevitable.

By tremendous expenditures of effort and money, the progression may be slowed -- it can never be halted -- but first someone had better determine from whom and for what we propose to protect our waterways, and at what cost for what return.

As regards the larger estuaries of the Gulf Cost, rapidly increasing yield records for both finfish and shellfish operations have been the rule since 1940, so that it is a little bit difficult to maintain the position that pollution is damaging the fishing industry.

Similarly, when we read in our local newspapers several times a week that this or that fishing party caught 60 or 80 or 100 or more speckled trout or redfish or lemonfish, we do not feel that the sport fishery is in imminent danger of extinction.

At the present time, the federal government and the majority of states are still unable to get together on mutually agreeable water quality standards for interstate fresh-water streams.

Standards for 10 states were approved in August, 1967, and there have been no additional approvals forthcoming since. In fact, major administrative and, presumably, policy implementation changes are in progress in the Federal Water Pollution Control Administration.

It is difficult to see how appointment of an attorney to the top federal position directly related to water pollution can assist in solving a fundamentally technical problem.

Gulf Coast estuaries are basically thin, wide films of relatively saline water overlying thick, nutrient-rich muds. However, they represent extremely complex hydrographic phenomena because of small tidal prisms, channeling, extreme wind effects, et cetera.

A great deal of noise has accompanied influx into these systems of phosphorus and nitrogen, primarily sewage derived.

Most of this concern is based upon attempts to extrapolate to these estuaries the hypereutrophication concepts derived from glacially formed, oligotrophic, northern lakes.

In fact, standing levels of dissolved nitrate and orthophosphate in unpolluted Gulf Coast estuaries may be as high as 0.5 to 1.0 ppm, with additional amounts of N and P present in other forms.

Recent studies in our laboratory on captive estuarine water masses indicate that endgenous total phosphorus level in the water column plus top two centimeters of sediment amounts to 62 pounds per acre, a level comparable to that employed in intensive agriculture.

Experimental addition of high levels of nitrate and phosphate -- up to 100 milligrams per liter each -- to such water masses produces no lasting tropic effect.

Thus, we do not see how addition of N and P from sewage can pose a threat to these estuaries. Similarly, BOD loading does not look like a menace. Natural sediments in these estuaries are organically enriched and highly reduced.

Redox potentials in excess of - 200 mv versus a saturated calomel electrode and an organic content in excess of three percent appear to be the rule.

One questions whether some additional loading by sewage-derived BOD can significantly affect this situation.

Torpey, summarizing historic data for New York Harbor and for the Thames Estuary, both cold-temperate environments, concludes that exogenous BOD loadings of about 0.2 ppm per day -- recalculated from his area-based values -- will lead to oxygen saturation deficits of 50 to 75 percent, depending upon temperature, salinity and similar factors; but that no further significant deficit is accured until loading increases at least six- or sevenfold or maybe more.

Since the sluggish, mud-loaded streams of the Gulf Coast often show endogenous BOD levels of one to two ppm, the estuaries into which these streams feed should normally be well above this threshold level.

Copeland has argued convincingly that the main problems with Texas estuaries seem to derive from lack of fresh-water inflow to dilute the saline environment, and most investigations of primary productivity phenomena in Gulf Coast estuaries indicate that turbidity, not nutrient supply, is the limiting factor controlling rate of photosynthetic carbon fixation -- compare various papers by H. T. Odum and associates, B. J. Copeland, et cetera.

It would appear, therefore, that decrease in fresh-water influx, with associated decrease in turbidity, probably constitutes a far greater hypereutrophication menace than does inflow of domestic and industrial waste waters.

Regarding the public health aspects of estuarine pollution, the sanitary status of shellfish-harvesting areas seems to be the item of most concern to a number of agencies.

In view of Nader's recent summary of filthy conditions prevailing in the fishing industry in general, there is some question as to why the mollusk fisherman should be singled out for action.

A case on Nader's grounds might be made for eliminating the entire fishing industry as a public service.

The criterion employed for classifying shellfish-harvesting areas is the coliform index. This was originally developed for fresh-water evaluation based on the consideration that coliforms, while themselves not normally pathogenic, were easy to detect and were evidence of presumptive contamination by human wastes.

Under saline conditions, the coliform index is equivocal at best. Published studies on survival of coliform organisms in salt water show widely divergent results in terms of survival times at various salinities.

Further, these survival times have not been related to survival of known, presumptively coli-associated, pathogens.

We are aware of one estuary which consistently yields high coliform MPN results and which drains an uninhabited watershed. What do we do about this?

From personal experience and from published data, we know that the MPN obtained from a particular estuarine area varies widely, depending upon hydrographic conditions such as mixing and stratification, and, in a given sample, varies equally widely depending upon whether inoculations are made in the field, in the laboratory with samples which have been held at ambient temperature during transport, or in the laboratory with samples which have been chilled during transport.

Yet this index has recently been employed by a federal agency as the basis for closing a major oyster-fishing area in Mississippi, with the not-so-subtle implication that unless the area was kept closed by the appropriate state agency, interstate shipment of oysters from Mississippi could be halted.

The official public position of the federal government and, particularly, of the Department of the Interior has been that the general public wants and will support water pollution control, regardless of cost.

How this position is maintained in the face of repeated instances of defeat of bond issues for sewage treatment facilities is not clear. Apparently, some thoughts are publicly unthinkable; for example, that pollution is not necessarily bad, or that the majority of citizens simply do not care whether or not the water is polluted.

We have recently encountered a similar situation in attempting to publish in "Science," official journal of the American Association for the Advancement of Science, a rebuttal to a highly biased article supporting legislation to permit a federal takeover of all the estuaries of the United States in the name of conservation, pollution control, et cetera.

The refusal to publish our reply seems hardly in keeping with the concept that the journal in question is presumed to be a forum for free exchange of ideas among serious scientists.

In summary, the estuarine water bottoms and adjacent shores are, in essence, public lands belonging to the states. Officials of each state know their problems, and each of them has a set that is a little bit different from the others.

There are different levels of success in control and administration of the various state estuarine areas, but the old nonscientific, petty political control is a thing of the past, and no one can claim with any seriousness or righteousness that there has been a breakdown in state control.

In Mississippi, we have had a more-than-quadrupled oyster production during the past eight years. The other commercial fisheries -- shrimp, menhaden, crab and industrial -- are at a high level, and so is the sport fishery.

With regard to some of these, we have effective control, and where we do not, we recognize the problems and are studying them assiduously both from the basic and from the immediately applied aspects.

The Gulf states have voluntarily banded together in an organization, the Gulf States Marine Fisheries Commission, to coordinate activities related to fisheries of the whole area, and this has been a successful effort.

Where we would stand if the federal government were running this show, we do not know, except that if their operation were as successful as the various states have been, we can reasonably assume that the cost would be considerably greater.

Because of rapid increase of knowledge in recent years, management of estuaries is approaching the stage where the problems tend to be more economic than biological.

We have grave doubts that the federal government is any more sensitive or adept politically than local governments in estuarine management. Thus, we are states'-righters, following an old tradition.

At present, we have navigation standards set by the U. S. Coast Guard and certain controls over construction in salt-water bodies administered by the Corps of Engineers, U. S. Army. That is enough.

The Gulf states are getting along well with local control. There are other fairly desperate situations in the United States in which the federal government can and must act and where its energies and powers can be expended more efficiently than in the estuarine situation, which is progressing fairly well.

Therefore, we take a position which will undoubtedly be considered extreme, and say: These are our estuaries. They do not belong to the federal government. If we want your help, we shall request it. Otherwise, kindly keep out.

MR. TRAINA: In your research, are you doing anything with toxic materials?

DR. ABBOTT: No, sir, we are not doing anything with toxic materials in estuaries except for a very limited amount of pesticide sampling by the Fish and Wildlife Service.

MR. TRAINA: Could you, or would you, make some comments regarding perhaps the relativeness of toxins present in estuary systems as opposed to freshwater systems?

DR. ABBOTT: It's awfully hard to do a comparing. I am not aware of any whole estuary that has been constantly polluted. There may have been one or two, but it's not a common thing.

MR. JENSEN: I wonder if you might speak just briefly on the relationship between pollution, physical modification of estuaries, say by dredging or filling, and community planning -- your views about how these three forces might best be handled locally.

DR. ABBOTT: I believe that dredging is going to continue and that reclamation of estuarine marsh areas will continue.

MR. JENSEN: What are your views on adequacy of research resources at the present time -- again, speaking of the Gulf Coast?

DR. ABBOTT: Lack of spending -- lack of money.

MR. THOMAN: How important are the estuaries for the larval form of shellfish and other fish?

DR. ABBOTT: It is presumed that some areas of estuaries serve as nursery grounds. This has been documented for some species, but not in toto.

MR. THOMAN: In your statement, which was pretty general, if I could summarize -- if I could put the words in your mouth -- we would pretty well forget a lot of pollution control as far as Mississippi estuaries are concerned.

Would you say that the point would be reached where these would no longer be productive nurseries?

DR. ABBOTT: My personal opinion is No, and it's just an opinion.

MR. THOMAN: How about BOD?

DR. ABBOTT: I think this is covered in my statement I just gave.

MR. THOMAN: Your comments on the total coliform tests are pretty well taken. I have no other questions. Thank you very much, sir.

And now we have Mr. Dudley B. Heiliger, member of the Mississippi Outdoor Writers Association, Gulfport.

MR. DUDLEY B. HEILIGER: First of all, I want to say I appreciate the opportunity to pop off a little bit. I can just hear a lot of you say, "I'm not an economist; I'm not a biologist; I'm a fisherman."

If you don't believe it, you go out and look in the cooler of my red station wagon and see what I did between 8:00 and a quarter to 9:00 this morning. And I'm not going to tell you where I got them either. (Laughter)

For 32 years, I worked with this cotton-pickin' outfit, this Department of Interior. Well, I guess the first few years, up until between 1928 and 1940, I was at the Department of Commerce, but it's all about the same.

So for 32 years, I lived with fish, raising fish at fish hatcheries all over the country, catching them and babying them. Incidentally, I believe that I have been fighting pollution in my own little way about as long as anybody in this room -- longer than a lot of you folks have been on earth.

For instance, I started in Leadville, Colorado, back in 1928. And then about the first Sunday I had to fish, I started over on the Arkansas River with one foot on one side and one on the other, and I fished down to where the drainage ditch comes in from the big smelter, and I caught trout above it and nothing below it.

And I came to find out that there was nothing below it for 50 or 60 miles, so we started right in there.

I recently got back from a three-week trip up in my native land of Wisconsin. You know, they always say Mississippi is always at the foot of everything, tail end, and I decided it was that way on pollution too.

We are probably 30 or 40 years behind in our pollution, but we are catching up. Places that I went through high school catching fish and trapping muskrats and mink -- well, those very same sports now are so polluted that a fish can hardly live, and there are no mink or muskrats left.

They stayed as long as they could, and they left when they couldn't live with it any more. But I heard Dr. Abbott say, because you read about catching 60 or 80 speckled trout or something like that, sport fishing is not affected by pollution.

Well, I'm going to give you a few statements and a few instances. As I say, I'm not an economist, not a biologist, but a fisherman.

I was coming back up to my boat one day -- oh, this has been five or six years ago -- at what we call Big Lake, and I guess you would say a pier had broken, and the mud was pouring into Big Lake.

I got in touch with the best man I could get, a junior engineer, a kid that used to follow me around out at the fish hatchery years ago, and he said, "We'll get it fixed right away."

I didn't get back there for about a week, and it was never fixed, and as a result, Big Lake, which was one of the finest bass-fishing spots in the country, now has no vegetation.

It has anywhere from a foot to three feet of mud in it now, and outside of getting a few redfish and specks when it's brackish, why fishing in that is gone; and ask any of the fishing champs out there, if you don't believe me.

Now, we have Graveline Bayou over here, a beautiful fishing spot. I was fishing in Graveline Bayou a few years ago, and the tide started coming in on a heavy east wind, and all at once the fishing stopped, and I figured that the fish had quit striking, and I just wondered if that water was fresh, so I tasted it.

Fellows, so help me, it almost burned my mouth. Incidentally, on this pollution down here, Hancock County doesn't have too much, well, let's say, progress.

They will probably jump me, so I will say they don't have quite as much pollution. Now, Harrison County is getting some. I would say they have medium pollution.

But fellows, if you want to see pollution, you go over in Jackson County. Something was coming in on that water from somewhere around Pascagoula, because that's where the current was from.

I don't know whether it was an acid or oil or what, but it messed my mouth up for two or three days.

Until this year, we have always depended on our winter shrimp from Bayou Casotte. There's just something about that bayou. I don't know if it's deep or what, but we could always get shrimp there.

This year we are getting no shrimp from Bayou Casotte. I have also found out that they don't even have any fish in Bayou Casotte any more. Something killed all the fish and all the shrimp in Bayou Casotte.

And I did some inquiring and I know a helicopter pilot who said that it was the same sludge, that is, the water running off from these rains, the same sludge that they asked us to dump 2000 tons a day ad infinitum; and what was it, two million tons they wanted to put in right away.

And incidentally, I wrote in to the Corps of Engineers or somebody -- I wrote my two-cents' worth in -- and I got a letter, and I have looked for that letter and it's lost in my crazy files.

But I would just like to read you what they said about nontoxics. Anyway, some of that sludge was dumped out there. Now, I don't see it, but three or four charter boat captains told me that they saw it out there and it was just like whiskey mash.

I don't know if the rest of you fellows know about whiskey mash; but there ain't a fellow from Mississippi who doesn't know.

And they said, when they run there, there weren't any fish for a long way, but we got that stopped. But for God's sake, let's not let them do that again.

But I notice that every time there is any dredging or any dragline work up in the bayous, the fishing around there deteriorates for a good while. But as I say, I'm just talking as a fisherman.

Now, I'll say one thing: In my 32 years' experience in the Department of the Interior and my nine years since all over the country, from one coast to the other, I sure don't believe in local law enforcement.

There are always too many friends, too many fellows with axes to grind, known to the enforcement officer; and I have seen it fall down more times when it was at fishing.

I am not going to get into this scrap between the state and federal governments. Now, I just want to say one thing to you boys with the Department of the Interior.

I started in the good old days when you could put in for a midnight lunch on your expense account. Anything that is at the federal level, there is so cotton much overlapping that so many departments, so many bureaus, so many divisions, that it's mighty tough to get anything done.

And I tried to get as high in the service as I could too, and I was pretty lucky. There are too many chiefs and not enough Indians, and so I just had to get that off my chest.

But as a sports fisherman, I just can't let down on my fish. Incidentally, those 60 or 80 speckled trout, most of those you read about are caught in Louisiana.

Incidentally, if a speckled trout comes up and stays 30 days in the water of Bernard Bayou, he's not fit to eat. And the fish that live there, I sure wouldn't eat.

I love fresh-water catfish, and I caught one a couple of years ago, and when I went to dress it, the smell was so strong of some pine oil or something, I had to throw it away right there.

So if anybody has any questions, I want to get back and go fishing. If anybody has any questions, pop 'em to me.

MR. THOMAN: Thank you very much.

MR. HEILIGER: Thank you very much.

MR. THOMAN: I will look you up sometime so I can catch a fish. I have never caught one.

We want to call on James Leker from Laurel, Mississippi, chairman of the Air and Water Quality Committee of the Mississippi Manufacturers Association.

MR. JAMES LEKER: The State of Mississippi has recorded significant economic development in the past few years, and the potential for continued development is excellent.

It is recognized that Mississippi must now plan for the intelligent utilization of its resources if it is to attain the maximum economic value in the future.

We are not suggesting that these resources, which include waters of the state, be reserved for industrial purposes; to do so would be short-sighted and disastrous.

Rather, we are insistent that the economic and social values to the state be carefully and accurately analyzed so as to fully realize the potential of Mississippi.

State agencies, industries, municipalities and the people of Mississippi must plan for the requirements of the future. The estuarine waters of the state represent one of the important resources.

Recent legislation has established the necessary machanics for the control of this resource and further created the Mississippi Air and Water Pollution Control Commission as the agency responsible for control and proper utilization of the waters of the state.

This is no small task, as we face it today. Water utilization and water quality standards must not only be related to today's requirments, but through the efforts of all parties with the Mississippi Air and Water Pollution Control Commission as the technical agency, plan the requirements for tomorrow.

Today our knowledge of southern waters, and more specifically Mississippi water, is quite limited. Standards, as they exist today, relating to thermal conditions, dissolved oxygen, BOD, turbidity, color and other water quality parameters have, in most instances, not been determined for this specific geographic area.

It is imperative that these standards be adjusted through research to be realistic for the conditions and area concerned.

In considering the estuarine areas or other waters of the state, it is recommended that the necessary research funds and technical assistance be made available to the Mississippi Air and Water Pollution Control Commission so as to determine the proper water quality parameters necessary for Mississippi.

With this information, it will then be possible to more intelligently assess the capabilities of the waters of the state and utilize these waters now and tomorrow for the maximum social and economic benefit.

MR. THOMAN: Thank you very much, Mr. Leker. We are, within the next two weeks, furnishing a trailer laboratory to the Mississippi Air and Water Pollution Control Commission, and I believe that the first place it will be located is in Gulfport.

We will do everything within our power to assist them, I assure you, and one thing I would like to suggest to you is that your association support their effort to get adequate budgets from the state legislature to do the job.

In testimony before a subcommittee of the Committee on Government Operations in the United States Congress, which was charged by Congressman Robert Jones from Alabama, some two or three years ago, I drew the comparison that if I remember correctly, the State of Mississippi at that particular time was spending less than one cent per capita per year for its state pollution control efforts.

This is not very much money, believe me, and I would comment that the reason that the federal government seems to get bigger at times is that there has been a lack of action at a lower level of government, and there has been some demand for it.

We don't like it exactly, and we hope that groups such as yours will support the state agencies.

MR. LEKER: This is a problem that faces people in the future, and I think it would be very short-sighted today if we didn't face it realistically and begin to plan for it, because I would say Mississippi, in this respect, is fortunate today.

They don't have the problems that are faced in some of the Great Lake areas and the like where they have high population concentration. Today Mississippi has the opportunity of protecting the water that it has and utilizing themselves and planning their utilization in the future, and I think this is an excellent position to be in.

If we don't take advantage of it, we are going to be sorry in the years to come.

MR. JENSEN: The amendment to the Federal Water Pollution Control Act that resulted in these hearings tells the secretary to prepare recommendations to the Congress for recommendation for a national program for the preservation study, use and development of estuaries.

Do you have any suggestions as to the proper relationship between state, federal and local government?

MR. LEKER: We would like to think the federal government would be in the area as a consultant and helping the state protect its waters in this instance and doing everything that it could to back the state up, the state agencies up, as I mentioned, with this technical assistance for possible research funds and the like for development and excellent legislative control and also water quality parameters for the specific area involved, whether it be a given estuary, whether it be a given stream, considering all functions of this being provided.

Let's face it, as we have seen today, we have many areas of interest for a given body of water, and it's at best difficult to try to determine how it should best be used and what maximum utilization we can get from it.

MR. JENSEN: Do you have any thoughts on how these various conflicting uses may be best accommodated?

MR. LEKER: I think I could make a lot of money if I could come up with the answer to that.

MR. THOMAN: Since the record will be open, if your committee of the Mississippi Manufacturers Association would like to consider this at greater length, say over the next six-month period, I'm sure that Mr. Jensen would be delighted to have your views on this matter.

This is one of the things we are attempting to get, and I suspect you could take it up to another year. If you would like to do this as a project over the next year, I'm sure that it would be most appreciated by Mr. Jensen's office.

MR. LEKER: We will see what we can come up with.

MR. THOMAN: If we can give you any technical help, we will be glad to do so.

MR. LEKER: I will say at this point, MMA, as it exists, has members who are quite interested. But let me say further that we are certainly not attempting to limit our views to the Mississippi Manufacturers Association.

As a committee, we have to get information to work with.

MR. THOMAN: Thank you very much. Next we have Joseph P. Glasscock from the Harrison County Development Commission. Mr. Glasscock.

MR. JOSEPH P. GLASSCOCK: Thank you, Mr. Thoman. Mr. Tommy Munro, president of the Harrison County Development Commission, prepared a statement and planned to be here to present it, but he, like Senator Nap Cassibry, is also a Senator and is being detained in Jackson.

MR. THOMAN: We appreciate your coming.

MR. GLASSCOCK: He has asked me to represent him, and I am a member of the Harrison County Development Commission. This statement is entitled, "The National Estuarine Pollution Study Statment of Harrison County Development Commission Presented to the Federal Water Pollution Control Administration at The Broadwater Beach Hotel on Wednesday, January 17, 1968."

The Harrison County Development Commission, a governmental body created in 1958 by state statute, has as its sole, and only goal, the attraction, promotion and development of such industry or industries as will benefit the community as a whole.

Harrison County, which is located at the top of the "Golden Gulf Coast" crescent, is fortunate in having an abundant supply of both surface and underground water to meet the present and future needs and interests of each and every user, if used wisely.

Water, therefore, has tremendous value to the economy of the area, since the tourist, recreation, seafood, manufacturing and many other types of industry located in the community have been founded and built on the premise of availability of this tremendous natural resource.

The primary interest that the Harrison County Development Commission would have with water pollution concerns the effect that it may have upon the continued economic development, growth, safety and well-being of the community.

Accordingly, it is the opinion of this body that:

1. The Esturine Pollution Study should be conducted.

2. The degree of pollution, whether from internal or external sources, should be determined and standards adopted to correct the undesirable situation, if it exists, that would permit the optimum use of the area's natural water resources to the maximum benefit of all interests.

3. An advisory committee made up of representatives from all local public bodies, institutions, private organizations, commercial enterprises, private industry, individuals, et cetera, should be created to work with the appointed state representative to insure that the area's interests are represented.

In conclusion, the Harrison County Development Commission desires to extend its cooperation to the Water Pollution Control Administration in its endeavor to make comprehensive study of pollution problems in the nation's estuarine areas. Respectfully submitted, Tommy Munro, president.

MR. THOMAN: Thank you very much, Mr. Glasscock.

At this time, I would like to read a document the vice-president of the Biloxi Port Commission was to have read. Unfortunately, he had to leave. It's signed by John A. Martiniere, director of the Biloxi Port Commission.

It reads as follows:

"The Biloxi Port Commission appreciates the opportunity of presenting this statement and thanks the Federal Water Pollution Control Administration for making possible this estuarine pollution hearing on the Mississippi Gulf Coast.

"The Mississippi Gulf Coast and the Biloxi area in particular is known as one of the largest seafood processing centers in the country. This industry is directly affected by the conditions of our surrounding surface waters for spawning and the development of seafood life. Fresh water streams flow into our area and supply plant life and other organisms that feed seafood in every stage of its life, therefore, the surface waters in and around the Biloxi peninsula must be kept clean and unpolluted in order to continue the future development of the seafood industry.

"The Biloxi area is also classified as one of the finest tourist centers in the country. Our tourist industry is greatly influenced and affected by the conditions of the local waters, inasmuch as the area has many navigable channels, both natural and man-made, an abundance of fish and wildlife, many sport and commercial fishermen, excellent water recreational facilities, an abundant water supply and many other beneficial uses of estuarine water. Therefore, in order to protect our present and future economy, our pollution problem must be checked and controlled for future growth of the area.

"The Mississippi Gulf Coast has three classes of pollution problems, fresh water, brackish water and salt water, where many other sections of the country have fresh water pollution problems only.

"The Biloxi Port Commission does not question the present verdict that the estuarine waters around the Biloxi peninsual are polluted as per the tests, study and reports. Off limit lines of polluted areas have been set up by the Mississippi State Health Department and enforced by the Mississippi Marine Conservation Commission. However, we are most anxious to have a study made pinpointing the source and reason for our pollution, whereby, preventive measures can be taken to clear up our serious problem of pollution for the present and future.

"To explain and prove that our pollution problem is a serious growing menace and where it could lead to, the attached plat shows dates and growth of our polluted area as follows:

1. Area north of Biloxi Peninsula, polluted Biloxi and Tchouticabouffa Rivers emptying into Back Bay of Biloxi. These streams are the source of fertilizer, plant food, and the life line of our seafood growth in and around Biloxi including many off shore areas.

2. From the mouth of Biloxi and Tchouticabouffa Rivers to Back Bay Bridge, highway 15 and 67 north, was declared polluted and off limits in 1933.

3. The polluted and off limit area was extended to L & N Railroad bridge over Bay of Biloxi in 1945. This area included some of the finest oyster reefs in the esturine waters.

4. Polluted and off limit area line was extended to Grand Bayou on Deer Island and east to Marsh Point in Jackson County in 1955.

5. Polluted and off limit line was extended through the Biloxi Pass, parallel to Deer Island and Biloxi mainland, to Biloxi Light House in 1963.

"Due to the natural flow of the tide and river currents, the entire front sand beach to the [illegible] of Biloxi Light House area is in danger of future pollution of water and sand beach which would ruin the attraction of our very popular and beautiful front beach area.

6. The mouth of Pascagoula River and entire area is now polluted and restricted to harvesting seafoods or uses for some types of water recreation.

7. The Bay of St. Louis area polluted and restricted to harvesting

seafoods or uses for some types of water recreation.

"Biloxi Back Bay is a most prolific natural seafood spawning area, oyster sperms from this area supply many of our large offshore private and public reefs with sperm and seedlings. At present this Back Bay area has many fine oyster beds of its own that are restricted to seafood harvesting and human consumption. If Biloxi Back Bay water was clean and unrestricted, it would furnish employment to 200 - 300 small individual oyster workers using hand tongs, and many individual oyster openers could gain livelihood, as in the days before pollution restricted the area. This project along would greatly increase the Biloxi area economy, especially with the elderly fishermen who are no longer able to do modern commercial fishing in the deep waters of the Gulf.

"A recent Biloxi oyster season was greatly handicapped by disturbances of nature plus our pollution problem as our local raw oyster stock processors were forced to import raw stock from Alabama, Louisiana and Texas, in order to fill long standing commitments.

"The Biloxi Port Commission thinks unpolluted water in the Biloxi estuaries area would give us a satisfactory local seafood crop annually, taken from our front yard to fill all commitments.

"It is the request and recommendation of the Biloxi Port Commission that the Federal Water Pollution Control Administration make a comprehensive study of the Biloxi estuarine area and advise proper authorities the source of this pollution and the recommended remedy and prevention of our pollution.

"Again we thank you for this opportunity to make this statement. Respectfully submitted, John A. Martiniere, director, Biloxi Port Commission."

The next statement will be given by Jeff W. Napier from Chicago, representing the Outboard Boating Club of America.

MR. JEFF W. NAPIER: Let me first express my pleasure of being invited to attend this hearing. The purpose of this hearing, to my understanding, is to obtain contributions from interested parties in order to help the Department of the Interior in its management of the nation's estuarine areas.

An obvious concern in managing estuarine areas, and our primary concern here today, is pollution control. Other concerns are making optimum use of estuarine areas and determining how this natural resource should be managed generally.

What is the optimum use of an estuarine area? What should be the goal or goals in management of these areas by the Department of the Interior?

There are possibly some who would still like to consider estuaries as a handy disposal area for industrial or municipal wastes. Boaters do not share these views.

There are many who feel that a natural resource such as an estuary should be used for the greatest benefit to the greatest number of people -- an old democratic concept.

This use concept is generally otherwise known as the multi-use concept in recreational circles. Boaters would largely endorse the mult-use idea for estuarine management as a realistic program to meet the demands for a limited natural resource.

We would add one condition, however. The qualification is that we do not feel that the multi-use concept should prevail if such use will destroy the estuary.

An estuary is destroyed if some unique and valuable facet of its existence is destroyed. Similarly, we do not think a multi-purpose concept should prevail if it permits one of the uses to so degrade the estuary that the other uses are no longer possible.

The biggest spoiler of unique and valuable estuarine assets is water pollution. The estuarine use most likely to push other users of an estuary out of the picture is the waste disposal or pullution use.

Therefore, we boaters favor a multi-use concept for estuarine management--as long as one of the uses is not pollution.

A survey of OBC members on their boating activities was made about a year ago. A nationwide sampling of about 20 percent of the membership, or about 4000 persons, was taken.

The results are informative for our consideration of estuarine management. Forty-three percent of us indicated that we use rivers and coastal waters as our primary boating areas. In many cases, if not most, these areas are estuaries.

Estuarine areas are popular for recreational boating because they offer sheltered waters and a generally good variety of fishing with the close proximity of both salt and fresh-water species.

Most major estuaries have major cities located nearby, which means the estuary is handy for the urban boater. Often they are an enjoyable route to scenic or historical sites. Our concern about estuary management is therefore obvious.

What do boaters use an estuary for? Boating, of course, but that term includes many related activities.

Again, according to the member survey, 95 percent of our members said they spent an average of 50 percent of their boating time just cruising. Sixty-eight percent spend one third of their time fishing. Sixty-seven percent spent 40 percent of their time involved in water skiing.

Other boating uses included hunting, swimming, racing and scuba diving. These activities, then, are what should be considered when talking about boating in relationship to estuary management.

What the value of recreational boating is in terms of the health, relaxation and enjoyment of our nation's people is hard to measure like all intangibles.

Perhaps an indication can be gained from the fact that there are eight million recreational craft of all types in use in the United States. An estimated 40 million people go boating every year.

Boat owners are estimated to spend about three billion dollars on all types of new and used boating equipment, fuel and services every year.

And finally, boating has been growing at an annual rate of more than fiver percent in the last several years. It is safe to say that boating is one of the more popular forms of outdoor recreation and is likely to become even more popular.

I could provide many more statistics indicating the value of estuarine areas to recreational boating. For the sake of brevity, I will not; but rather, I'll trust that the general facts and figures given have indicated the great interest of boaters in estuary management.

It naturally follows that we are also greatly concerned with problems of pollution of all waters, including estuarine areas.

Probably boaters have observed first-hand more of the damages of pollution and littering of more of this country's waters than any other recognizable group of persons -- including Federal Water Pollution Control Administration employees.

Few groups have a bigger stake in clean water than boaters. Pollution takes the fish out of our fishing, the health from our water contact sports and the beauty from our shores and beaches.

It puts scum on our hulls, the stench of oil, chemicals and garbage in the sea air and substitutes a spectrum of bilious colors for blue water. You don't have to sell boaters on fighting pollution.

We cannot make detailed or technical recommendations on how the massive volume of vile liquids from industrial and municipal sewers can be stopped from entering our boating waters.

It is unrealistic to think that all of these pollutants can be stopped tomorrow. Federal grants to municipalities and tax concessions to industry for pollution treatment plants is one answer over the long haul. Will it be enough before some of our waters are beyond saving?

Consider, for example, my home area of Chicago on Lake Michigan. Just one steel plant in the huge industrial complex at the south end of Lake Michigan pours 440 million gallons of pollutants into the lake every day, according to the Illinois Sanitary Water Board.

If you can imagine, this amount would fill a receptacle a block square and 20 stories high every day.

Since the south end of the lake is not 20 stories deep, the net result is that several square blocks of water area are thoroughly polluted, surface to bottom, every day from this one plant. I'm sure there are similar examples in the estuaries in this part of the country.

It is almost impossible even to imagine how all the recreational boats in the country could equal the spectacular pollution achievement of this one industrial plant on one body of water.

Every one of the eight million recreational vessels in the country would have to be a veritable floating bathroom all year around to do what this one plant -- typical of many industrial and municipal polluters -- does in only a day.

For example, each of the eight million motorboats, sailboats, canoes and rowboats, regardless of size, would have to be equipped with a toilet. Each toilet would have to flush two gallons of liquid, three times an hour, 24 hours a day, all year long to equal the 440 million of effluent of this one plant on one body of water. Needless to say, this is not the case.

As a matter of fact, four years ago the National Association of State Boating Law Administrators appointed a Pollution Committee to investigate how shipshape boaters were maintaining our nation's waterways.

After an exhaustive nationwide survey, the NASBLA Pollution Committee concluded that pollution from recreational boats was negligible in virtually all waters.

A few specific areas of heavy mooring in stagnant water areas were the only exceptions. The committee further concluded that less than ten percent of the nation's recreational fleet is equipped with marine toilets.

Although pollution from pleasure craft was not found to be a problem, the committee realized that it could become one in some areas and that the lack of a problem would not necessarily forestall a host of nonuniform legislative "solutions."

As a result, the committee recommended, and NASBLA adopted, a Model Act on Sewage Disposal and Littering from Vessels and a guide for jurisdictions which felt regulation necessary.

The recommended Model Act has since been followed by several key boating states. The act prohibits untreated sewage discharges into the waters but allows toilet use with chemical treatment devices meeting cretain effluent standards, incineration or holding tanks.

Just what a minimum treatment standard should be is now in final stages of a study by the National Sanitation Foundation of Ann Arbor, Michigan.

This nonprofit testing laboratory is being assisted in this work by state and federal health officers, the people who have the final say on acceptability of treatment devices in their respective jurisdictions.

Endorsement of the NASBLA Model Act implemented by the Sanitation Foundation's uniform performance standards for watercraft sewage treatment devices has come from many quarters.

In addition to endorsement by the Outboard Boating Club of America, the National Boating Federation, a national organization of state boating clubs, is in favor of the approach; so is the National Conference of State Sanitary Engineers.

Granting that regulation of discharges from pleasure craft is inevitable, although not generally warranted at this time, the most ideal solution from the boater's standpoint would be adoption of the NASBLA Model Act by all states -- covering both waters of exclusive state jurisdiction and waters of concurrent state-federal jurisdiction.

The question is, how can we get all states to do this on a uniform and reciprocal basis?

In the final analysis, federal legislation setting forth guidelines which the states will be obliged to follow may be necessary in order to secure this uniformity.

There is precedent for this in the Federal Boating Act of 1958, under which 47 states have complied with federal standards in exchange for the opportunity of numbering pleasure craft on all waters within their territorial limits.

In the same manner, NASBLA's model act on waste discharge from boats might be made federal law. Whether state or federally administered, boaters would have only one basic law governing them in pollution and littering matters.

This answer seems very reasonable, logical, workable and in accord with various federal water quality control laws which set guidelines but leave primary responsibilities of administration and enforcement to the states. "Creative federalism," I believe it's called, that is used to describe this relationship.

Regrettably, this is not the approach being taken by the federal government. Two study reports of vessel discharges were recently prepared by the Secretary of the Interior through the Federal Water Pollution Control Administration: one for the Congress and one for the President.

Boaters feel that both the data presented and the recommendations made by these studies are highly unrealistic.

For example, the studies say that 1.3 million pleasure boats out of the eight million motorboats, sailboats, canoes and rowboats in the country are equipped with marine toilets. That's one out of every six boats!

Yet, a recent survey asking all marine toilet manufacturers how many units they had produced every since they were in business indicated total production of all marine toilet manufacturers combined to be only 500,000 to 700,000 units.

Even if every unit were still in use, total production over the years has amounted to only half of what the FWPCA report claims are in use.

Clearly, the researchers of the report did not consult the National Association of State Boating Law Administrator or the NASBLA Pollution Committee or even knowledgeable boatmen when they came up with further breakdowns on the number and types of recreational craft equipped with marine toilets.

The report says that 90 percent of all inboard boats, 80 percent of all outboard boats over 16.5 feet in length, and 50 percent of all sailboats without auxiliary power have toilets.

In 1966, marine industry sales records show that 81 percent of all sailboats shold without auxiliary power were 15 feet or under, and about one third of these, the surfboard-with-a-sail type.

Yet, according to the FWPCA report, 50 percent of these sailboats under 15 feet in length have toilets. If this were the case, boaters should worry more about indecent exposure than pollution. (Laughter)

In view of the inaccuracy of the FWPCA's impression as to the magnitude of discharges from pleasure craft, we would suggest that closer liaison with boating groups should be developed where none has existed heretofore.

As a matter of fact, the National Association of State Boating Law Administrators suggested just that by resolution at their annual meeting in San Francisco last November.

We all want to clean up pollution in our nation's waters, and we want estuaries to be unpolluted. Boaters are now, and have been for years, in the forefront of the fight against pollution.

We are and have been supporting legislation which would require us to undertake substantial expenses on our boats to insure that they do not contribute to the pollution of our waters.

This legislation, notably the NASBLA Model Act, or simila provisions, is on the books in several states and will be effective in many others within the next two years.

Yet, on the basis of unsupportable facts, the FWPCA steamrollers ahead ignoring the work that has been done to stop even the minimal discharges contributed by boaters.

All boaters throughout the country can't even discharge in a year the equivalent volume produced daily by one industrial plant on one body of water.

In conclusion, I submit that the FWPCA should more effectively direct its efforts by supporting adoption of the NASBLA Model Act and National Sanitation Foundation standards into federal law, enabling greater devotion to the overwhelming task of cleaning up the major sources of pollution.

Only by concentration on the major sources of pollution will our actions be timely enough and of sufficient magnitude to protect and preserve the waters of our nation's estuaries for all who may wish to use them.

I have a report of the Pollution Study Committee of the National Association of State Boating Law Administrators, and I would like this to be added to my statement.

(The above-mentioned "Report of the Pollution Study Committee, National Association of State Boating Law Administrators" is entered as Appendix I at the conclusion of this verbatim transcript.)

MR. THOMAN: Thank you very much.

MR. TRAINA: There are a number of points I would like to discuss, but I know I can't go into all of them, but I would like to ask you about two of them.

First of all, you referred to the aesthetic values of water and aesthetic criteria which should be applied to water, sir. Do you have any further thoughts along this line?

Both the state and federal governments have been traditionally using BOD and this kind of thing. With emphasis on recreation, now, other criteria are coming. Do you have any other thoughts along this line?

MR. NAPIER: When a boater goes out in the area with his family on a Saturday morning and they decide they are going to do a little fishing and stop on a sand bar or island and have a picnic, when they get there, they are very likely to find their trip to be most unpleasant.

Something that we all don't like is when you find garbage on the beach or when you find such things on the hull of your boat, such as some type of scum that is hard to get off.

Indeed, it may adversely affect the finish on your boat, in addition to not looking good and requiring extra maintenance and that aesthetic consideration.

MR. TRAINA: We also face the problem of economic damage, but how do you relate this to a sense of sight and smell?

MR. NAPIER: Well, I think it is regrettable in this aspect, if your area is an open sewer, you're not going to have any boaters. As a result, any local tourist industry that might otherwise have their business there will not.

If it has existed in that area, it will decline substantially. People will not use that area. So I think you can say that there is certainly an economic loss here.

MR. TRAINA: This relates now to maybe my second point, specifically the Mississippi coastal area. Has your association or any other group done any work in determining the potential in this area for boating?

MR. NAPIER: Not really. I take that back. Under the Land and Water Conservation Fund Act, grants are available to the states for various outdoor recreation programs.

The states, in turn, although they have to come up with a 50-50 matching amount of money, may make these available to local subdivisions, such as the cities and so forth.

But before the states can apply for the federal matching grants, they do have to submit a comprehensive inventory of all their outdoor recreation facilities, and in addition, a projection of future needs.

So if you're talking about the potential of outdoor recreation in general and even boating in particular, at the present time these would probably be the most expensive sources in most states.

MR. TRAINA: One final question. Do you know what specifically the State of Mississippi is doing regarding standards for vessel craft --

MR. NAPIER: No, I don't. To my knowledge, they are not doing anything. I don't know whether they will or not.

MR. TRAINA: Thank you.

MR. THOMAN: Thank you very much, Mr. Napier.

At this time, I would like to recognize three rather distinguished guests here today. First of all, Joseph Brown, who is the Chief Sanitary Engineer for the Mississippi Department of Public Health.

Joe, would you stand up so people can see you?

Art Beck is Chief Engineer for the Alabama Department of Public Health and is the Executive Secretary of the Alabama Water and Air Pollution Commission.

And I would like to introduce to you my counterpart, Mr. William Gallagher.

I would now like to introduce to you Mr. Louis Fondren of the Mississippi Gulf Coast Seafood Association.

MR. LOUIS FONDREN: Mabry R. Penton is not able to be with you this morning. Therefore, I am speaking to you in behalf of the Mississippi Gulf Coast Seafood Association.

I know very little myself about seafood or about fishing, but on behalf of the association, I would like to pose a question to you gentlemen that they have requested be posed to you.

This question is, Why, in the past 15 years, has the Mississippi coastal area gone from Number 1 to about Number 8 or 9 in the production of oysters?

Have you gentlemen considered an answer to this question?

MR. THOMAN: Gene, are you able to answer that?

MR. JENSEN: Well, several previous speakers, I think, have mentioned the gradual closing of many of the oyster-producing areas. Certainly, Back Bay, at one time, was a vastly productive area.

Pascagoula was a vastly productive area also. Not only does pollution interfere with the sale of oysters, that is, as a public health hazard, but certainly many pollutants also interfere with the normal reproduction and growth of oysters.

And I don't believe there have been any extensive studies made, but I would guess that consequences are a result of these three things: that industrial contaminants of one kind or another, in pesticides have interfered with the normal oyster population, crossing of the methods has interfered with the hatcheries, and undoubtedly there has been dredging and fill which have modified, so they are no longer and could no longer be productive.

MR. FONDREN: When you submit your report, will it give your analysis of the answer in the record to the loss of oyster production along the Mississippi Gulf coast?

MR. THOMAN: Mr. Brown, would you care to comment on this, or would you like to furnish something for the record later?

MR. JOSEPH BROWN: I can make a statement now, although I wasn't prepared to make a statement. I think most of the comments that I would make have been very well covered.

As to an answer to your question, I think it's a combination of things. The shellfish production in Mississippi has declined.

I have some personal opinions as to why in some respects -- certainly pollution, the growth of pollution. The expansion of pollution has added to this.

Another factor to be considered is that people don't yet have a satisfactory economical method of treating waste that will remove all the harmful benefits of it, and when you have a population growth like we have in the surrounding oyster-growing area, some of this that cannot be economically removed from the waste is going to get into the streams.

It has to go somewhere, and when it does, it affects it. Hence the oyster production is the first thing that it hits.

Not too many statements have been made, I noticed, on the effect, public housing effect, of pollution. People being what they are, generally, do not consider public health until they get sick, and then it's too late.

As a member of the state public health team, we try to prevent these conditions from occurring. At times we are the bad old man who comes in and closes an oyster reef. These things have got to be done.

If they aren't, people will get sick. I'm sure this is a nasty word on the coast. Any of you who have had any dealings with the oyster industry can remember a little scare we had several years ago, the infectious hepatitis outbreak.

Whereas I still maintain it wasn't tied down specifically to the ingestion of raw oysters from polluted areas, statistically it was shown this was a probable major factor, so hence we had to bear down on the oyster production again.

It's a problem that's going to continue with us, and as pollution and population expand, the oyster industry is going to catch the brunt of the whole problem.

It will be the first one that will be noticed. One statement that was made, and I would like to comment on it, the recent closure of a major reef on the Gulf area was not based entirely on the coliform organism -- neither do the Public Health Service standards and recommendations rely wholly and solely on one or two organisms.

The probability cause of these organisms is one of the major factors. So I think this is probably the answer to your problem of why the oyster production in Mississippi is going down.

This is one of the reasons -- people and good, clean water, most of the time, don't go together. This is one of the prime reasons.

MR. THOMAN: Thank you so much, sir. I might comment -- and I hope that you will convey this on to Mr. Penton -- as Mr. Brown has stated, any time there is any physical alteration of an ecological system, or as you bring more people into an area or more industry, there is a disruption of the system, and I believe several speakers have touched on this this morning.

As this occurs, something generally suffers, and I believe I mentioned this in my opening remarks. One of the major purposes of this series of meetings is to elicit comments from people such as yourself and the group you're representing as to what they think will be the best management plan for the future in these estuaries.

These are things that we are trying to develop here, and if you would like to comment on that now or take it back to your group and give us at some later date a statement that would outline your views, we would be more than pleased to receive it.

It's a question of balancing it, and then when you get on the question of balances, who does what kind of government, should it be regional, interstate, intrastate, federal, or just how should it be done?

You have these very dichotomous uses that occur, and this is what we are trying to find out, what are the relative values of these things. We don't know, frankly.

MR. FONDREN: I'm not knowledgeable of who is the best manager of these estuaries that you are talking about, but I'm sure that some members of the association have some ideas on this.

The association is vitally interested in whether or not your report will cover the reasons for the decrease in oyster production along the Mississippi Gulf coast, and I assume that I can answer to the association saying that your report will cover these reasons and that you will make some recommendations based upon what you hear this morning.

MR. W. J. DEMORAN: I would like to know upon what Mr. Fondren bases his statement that Mississippi's production has fallen. Mississippi has never been Number 1 in oyster production.

Maryland has always been on top, and Louisiana has always been before Mississippi. We can't compete in production with these large coastal areas. We only have 900 square miles of water bottoms in Mississippi.

Of this, we have 7500 producing acres. This is all that we have ever had. I don't know what the average is on the east coast, but we cannot compete with those large areas like that.

The Bureau of Commercial Fisheries has accurate statistics and figures which give the oyster production in Mississippi. I'm a very good friend of Mr. Penton's, by the way, and I don't know where he got his figures, but I would like to know.

I deal with oysters daily in my work. Our oyster production has increased since 1960. I will grant you this: that oyster production in Mississippi has declined considerably since the '20s and '30s.

In 1960, Mississippi had the greatest production since 1939. In 1939, Mississippi produced over 400,000 barrels of oysters.

The production declined right after World War II. I think the production during that time was around 30,000 barrels. Most of this, I believe, was from tong areas.

But in 1960, our production rose to over 100,000 barrels. In 1962 - '63, Mississippi produced over 300,000 barrels of oysters. And, I will grant you, all of this was not dredged.

A portion of this was tonged. Since that time, we have been able to maintain our production. And I will grant you this also: this figure comprises mainly oysters that are dredged off from large areas.

We have lost production in our bays, namely, Biloxi Bay, which I believe -- I think I'm not wrong in making this statement -- that Biloxi Bay could supply every raw oyster dealer in the state.

I will also mention this fact, that some of the raw oyster dealers have had to go out of state in order to purchase oysters to fill orders early in the season.

The way I see it, this is strictly an economic thing. This is an industry-created problem. This particular problem of having to go out of the state is strictly industry-created, and it seems to be a labor problem, which the raw oyster industry is going to face and have to face and have to account for.

It's a problem that only they can correct. That is all, Mr. Chairman, I have to say.

MR. FONDREN: I'm not sure I understand your last problem -- a labor problem decreases the oyster production?

MR. DEMORAN: The raw oyster dealers have not been treating the tonger fairly in regard to the price that is paid for the oysters that are brought in by the tonger.

If you will check the records, you will see that the oyster tonger gets very little for his catch. This has always been the problem: The cost of living has risen, but the prices paid for tong oysters have not gone up in comparison.

MR. THOMAN: Excuse me. This seems to be something that is not quite relevant to the meeting here, and I think that you and Mr. Demoran should talk about it later.

MR. FONDREN: Could I mention one other thing?

MR. THOMAN: Yes.

MR. FONDREN: It's my understanding that Mississippi has had less oyster production than it has in the past. Am I correct?

MR. DEMORAN: That was correct until 1960, and our production has soared since that time.

MR. BROWN: Mr. Thoman, I want to correct one statement I made. I may have been a little misleading in my statement when I spoke of oyster production decreasing.

This is erroneous. I was speaking mainly of the areas where useable oysters for direct marketing are available. This has decreased as far as the public health standpoint is concerned.

I wasn't speaking in oyster production in the overall sense. I believe Mr. Demoran's statements are more correct.

MR. THOMAN: If you would like to supplement this with some written statement, we would appreciate it.

At this time, I would like to introduce to you Mr. Claude Ramsay, president of the Mississippi AFL - CIO. Mr. Ramsay.

MR. CLAUDE RAMSAY: It might have been well if I had gotten here before the last discussion. I will also be discussing the shellfish problem.

Organized labor in Mississippi is very concerned over the preservation of our natural resources. We consider the estuarine areas of this nation to be among the most valuable of those resources.

As I understand it, this hearing is designed to seek information that will eventually lead to the elimination of pollution in our streams that, in turn, pollute these estuaries.

This being the case, I want to congratulate those responsible; this hearing is most timely and is long overdue.

As all of you know, much of the seafood consumed in these United States comes from the Gulf of Mexico. For all practical purposes, the Gulf of Mexico is the seafood basket of the nation.

Since Mississippi borders the Gulf, I propose, to the best of my ability, to show you how pollution from Mississippi streams affects this body of water.

Mississippi has many rivers and streams that eventually drain into the Gulf of Mexico. The western border of the state is the Mississippi River, with many streams and lesser rivers emptying into it.

The entire western half of the state is drained by the Mississippi. This includes the large Delta section where cotton and other crops are grown.

Insecticides and other chemicals are used extensively on these crops, and these insecticides and chemicals are eventually washed into these streams.

Since the Mississippi passes through Louisiana, and since you will take testimony from people of that area, I shall not go into detail.

I would simply call your attention to the fact that in addition to city sewage and industrial waste, tons of insecticides and chemicals help pollute the Mississippi River.

Fish kills of some magnitude have been recorded around the mouth of the Mississippi in recent years. Reportedly, insecticides have been responsible for these kills.

Most of Northeast Mississippi is drained by the Tombigbee River, which eventually drains into the Gulf at Mobile, Alabama. Pollution problems of this stream are the same as the Mississippi, though probably not as severe.

Since you will be taking testimony from the people of Alabama, I propose to leave this problem to them. I would simply point out that Mobile Bay is an important estuary and pollution problems have been rather severe in the past.

The southeastern, central and southern parts of Mississippi are drained by two river systems which originate and terminate largely within the state's boundaries. These are the Pearl and Pascagoula River systems.

The Pearl has long been known as one of the worst polluted streams in the state. Jackson, the largest city in Mississippi, dumps its raw sewage into the Pearl, as do a number of smaller towns.

Pollution of the Pearl is further aggravated by industrial waste on its way to the Gulf. During periods of light rainfall, fish life is practically nonexistent for several miles below Jackson.

I should also point out that this river is polluted by waste from Bogalusa and other towns in Louisiana before it reaches its destination.

The Leaf and Chickasawhay come together at Merrill to form the Pascagoula. The Escatawpa, a small river originating in Southwestern Alabama, joins the Pascagoula at Moss Point.

The Pascagoula, in turn, empties into the Mississippi Sound at Pascagoula.

In addition to the above-mentioned streams, a number of small rivers, bayous and canals empty into the sound from one end of the Mississippi coast to the other. As a rule, each one of these streams is polluted to a certain degree.

As already stated, the Gulf of Mexico is the seafood basket of the nation. Its value to future generations cannot be overestimated.

The Mississippi Sound, including many bays, bayous and inlets, is the spawning ground for much of this sea life. This includes shrimp, fish, crabs, and shellfish.

Oysters produced in these waters are among the best to be found anywhere in the United States. It would, therefore, appear that this section should lead the nation in oyster production.

Unfortunately, this is not the case, as you well know. Only a fraction of the potential has been realized as of this date. This is due in part to the lack of initiative by the State of Mississippi and adjoining states, and is due in part to the polluted water of much of the area.

Of all seafood, oysters are probably more adversely affected by polluted water than any other. Unlike fish and shrimp, they cannot flee, and since their source of nourishment is sediment and sea water, they immediately absorb any pollution coming their way.

Any oyster fisherman in the area will tell you that oysters need a certain amount of fresh water to thrive. They will further tell you that some of the best oyster reefs are adjacent to the mouth of the fresh-water streams under discussion.

These fishermen will also tell you that they have been prohibited from harvesting oysters in some of these waters in recent years because of the high bacteria count.

In most cases, this high bacteria count can be traced directly to raw city sewage that has been dumped into one of the streams already mentioned.

For many years I lived in Moss Point and fished the waters in this area; I naturally have more knowledge of this section than any other.

The Escatawpa and Pascagoula Rivers have been plagued by pollution problems for many years. Refuse from the Masonite Corporation plant in Laurel almost eliminated fish life in the Pascagoula River a few years ago.

Presumably, because of a number of lawsuits and the threat of many others, this company finally built a purifying system. As a result, much fish life abounds in this stream today and, needless to say, Masonite refuse is not being dumped into the Mississippi Sound and is no longer damaging sea life in the area.

Refuse from International Paper Company's plant in Moss Point and several menhadden plants in the area, along with raw sewage from the city of Moss Point, caused several miles of the Escatawpa to become a dead river a few years ago.

Pollution was so bad in this stream for many years that no kind of fish life could survive. Moss Point is only a few miles up river from Pascagoula.

After Pascagoula made its contribution of industrial waste and raw sewage, the water was more than contaminated when it emptied into the Mississippi Sound.

A number of fine oyster reefs can be found in the bays and inlets around Pascagoula, but the bacteria count is usually too high for human consumption. The only time these oysters are fit for consumption is after a period of heavy rainfall up state, which flushes pollution out to sea.

The State of Mississippi, as well as the United States of America, cannot allow such conditions to continue. The fresh-water streams already mentioned, along with their estuaries, are public domain and should be guarded as such.

Generations yet to come will depend upon these waters for sustenance, as well as recreation.

While it is true that Moss Point has already installed a sewage disposal plant, and other towns and cities have done the same, it is also true that there is still much room for improvement.

Hopefully, the Water Pollution and Control Act, as amended, will provide the vehicle to clean up all city sewage. If and when this is done, we will still have to deal with the problem of industrial waste and insecticide pollution.

Industrial waste that is being dumped directly into the Mississippi Sound and the Gulf of Mexico is still another problem that will have to be dealt with if the coastal waters are to be completely cleaned up.

A good example of this can be found in the Bayou Casotte area just east of Pascagoula: The Standard Oil refinery dumps its waste into a canal that empties directly into the sound. A trip along this coast discloses an oil slick that reaches out into the Gulf of Mexico.

In conclusion, I want to emphasize the fact that the users of these waters, regardless of who they are, must be forced to purify their waste before dumping it into our streams or other waterways.

The record is clear; the states will not, or cannot, cope with the problem. Obviously, if the job is done, it will have to be done by the federal government.

MR. THOMAN: Thank you very much.

MR. RAMSAY: I will be glad to answer any questions within my ability.

MR. TRAINA: Mr. Ramsay, one of the pieces of information that needs to be obtained through this study and the whole area of estuarine management is that of economic value.

Do you have an estimate, or can you determine an estimate, of the pay rolls that are involved in estuary development -- derive the economic value from the estuaries in this state?

MR. RAMSAY: We haven't made any such studies. I would hope that such a study would be made by one of the agencies in the state.

PARTICIPANT: I represent the Jackson County Port Association. About a year ago we attempted to make a survey on the economic value of commercial fishing and sport fishing.

County agents for Jackson and Harrison Counties have a report known as the OED Report, and it has this labor force and everything else broken down. I guess that is a state agency in cooperation with the Department of Agriculture.

Also the Bureau of Commercial Fisheries statistics break all the phases of the commercial fishing industry down by each state and by each county within the state.

They have the number of working units, and boats and vessels and number of individuals employed, et cetera. And I'm sure you can get a lot of this information out of that.

OED is the least known of the two publications, but the Mississippi Research Development Center currently has one of these copies from Jackson County, and it contains information of all sort clear through to the labor force.

MR. TRAINA: Does this go into the same term of restaurants and so forth, and this kind of thing?

PARTICIPANT: I can't remember, but I know they have the fishing camps and also the number of people employed by, say, Standard Oil.

MR. THOMAN: Thank you very much. Gene, do you have a question?

MR. JENSEN: Somewhat the same question that I have asked before a couple of times. Do you have any thoughts or any ideas that you might have on the proper legislation that should be taken next, whether estuarine control should be totally federal, or totally state, or totally local or some combination of these three?

MR. RAMSAY: I don't see how in the world you can avoid federal regulation in this particular area. I'm not going to get involved in a states' rights argument.

But the fact remains that the streams that we are talking about cross state boundaries that eventually empty into the estuaries that we are considering, and when I speak about this situation, I'm not talking about just the Mississippi waters; I'm talking about the entire Gulf of Mexico, including the coastline of Florida, Alabama, Mississippi, Louisiana and Texas.

All up and down the coast, you're going to find the problem to be the same. It's worse in certain areas than it is in others, and if, as someone testified here already, we are fortunate in Mississippi to this point that, due to the fact that the state is just now becoming industrialized, we don't have the real severe problems of pollution by industrial waste that you find in some of these other states.

But in the Jackson County situation that I have referred to, and has been referred to here prior to my testimony, is a good example of what can happen to this state once it becomes an industrial state, and it will eventually, and not in the too-far-distant future.

I don't see how in the world this problem can be coped with without a federal regulatory agency. You have an Interstate Commerce Commission. You have all other kinds of economists, and I think you're going to have to go to this in this regard.

MR. JENSEN: You base your position as far as pollution is concerned. What are your feelings or your views, then, on estuarine modification, that is, filling in of the wetland, or construction in major channels?

Secondly, what are your views on community planning in the immediate vicinity of the estuary?

MR. RAMSAY: Well, I think there has to be a lot of careful planning -- community, regional, state, whatever you have. As I mentioned in my testimony, future generations have a stake in the preservation of these resources, and I don't think that any group or any organization has a right to jeopardize the estuary systems of this nation for generations yet to come.

Yet I think very definitely there needs to be some long-range planning, and I'm hopeful that the State of Mississippi, as a result of some recent legislation, establishment of a Research and Development Commission, will move into this area along with some other things they have on the schedule.

MR. THOMAN: Thank you very much, Mr. Ramsay. Your statement is completely clear and certainly will be taken into account.

At this time, I would like to ask if the League of Women Voters Association has a statement which they would care to make?

MRS. FRAN SIRJANE (from the League): No.

MR. THOMAN: I didn't want you to think this was completely a male affair.

I would next like to call on H. H. Bell, Jr., operating manager of the Mississippi Power Company, Gulfport, Mississippi.

MR. MURRY LUCKY: Mr. Bell is not able to be present.

MR. THOMAN: If you would, identify yourself for the reporter.

MR. LUCKY: I am Murry Lucky, supervisor of production for the Mississippi Power Company. I am to present a statement in behalf of Mr. Watson, who is also not able to be present. Mr. Watson is our president.

His statement reads as follows:

"My name is A. J. Watson, Jr. I am president of Mississippi Power Company. The company is a public utility engaged in the generation, transmission and distribution of electric power to the public in twenty-three counties in the southern portion of Mississippi. It owns and operates steam electric generating facilities, together with high voltage transmission lines between those plants and the facilities of neighboring utilities, and with distribution facilities for the furnishing of electric service to the inhabitants of its operating area. Among other Generating plants owned and operated by the company is the plant known as Plant Jack Watson, located in Harrison County, bordering on Biloxi River, an estuary within the meaning of the Act of 1966.

"Plant Jack Watson consists of two 75,000 kilowatt steam electric turbine generators, one 112,000 kilowatt generator, and scheduled for commercial operation in June of 1968 is a fourth generating unit of 250,000 kilowatt size. Fuel for this plant consists of gas for all units except the 250,000 kilowatt unit, for which the fuel will be coal.

"A modern design steam generating plant must have large quantities of cooling water for its main surface condensers. Such cooling water is not consumed, but is returned to the source from which it came, unchanged in quality except for some change in the temperature thereof. Change in temperature of cooling water is quickly reduced, as the heat is rapidly transferred to the environment after the cooling water leaves the condensers. A major design consideration for a steam electric generating plant is that adequate cooling water be present, and that the plant when operated will not raise the source temperature of the cooling water, since the thermodynamics of condenser design requires that the cooling water temperature be as low as possible in order to promote the more efficient operation of all of the generating units. The company, therefore, has an interest in maintaining as close to normal as possible the temperature of Biloxi River, which is the source of its cooling water.

"Feed water for the boilers is supplied from deep wells and is not drawn from Biloxi River.

"The company realizes and fully appreciates the need for the preservation of estuarine waters as free as possible from all sources of pollution and supports governmental endeavors to achieve this result. While the company realizes an extreme rise in water temperature may have some detrimental effect on certain fish life, in the case of its Jack Watson Plant during its eleven years of operation, it knows of no cases in which damage to aquatic life has occurred by reason of thermal change in Biloxi River, due to its plant operations.

"At Plant Jack Watson cooling water is drawn from Biloxi River and pumped through condensers. In this process, heat is absorbed by the cooling water and the temperature is raised. The condensers are large vessels which, in principle, are comparable to an automobile radiator. The exhaust steam from the turbines is cooled and condensed to hot water for return to the boilers as a result of the river water flowing over thousands of feet of small steam carrying tubes -- just as air reduces the temperature of hot water for recirculation to cool an automobile engine. This cooling water then flows into a discharge canal. This canal, one mile in length by seventy feet in width, affords considerable surface for this water, through radiation, to give up some of its heat to the atmosphere. Upon leaving this canal, mixing occurs with the waters of Bayou Barnard and Big Lake, at which point the temperature is further reduced both through the mixing and dilution process and radiation.

"The company must carry out its public obligation, as virtually the only supplier of electric energy for that portion of the state in which it operates, and doing so involves the most economical and efficient steam plant operation consistent with the preservation of, insofar as possible, the natural state of the waters which it uses in its generating processes. The public interest in efficient and economic electric service must be considered in evaluating the respective benefits of estuarine waters on the one hand and the availability of electric energy for a modern society on the other. The company does not believe that there need be a conflict between these two objectives, and it further believes that its operations satisfy both.

"Use of estuarine waters for cooling purposes in steam electric plant generation is a customary and legitimate use of these waters. So far as the company is advised, there has been no case of damage or injury to aquatic life or the availability of these waters for use for recreational or other purposes by reason of its plant operations."

MR. THOMAN: Thank you, sir. I have one or two questions that I would like to ask. As areas develop and you get large accumulations of population and the electric generating companies have to increase their production, in many parts of the United States, the temperature of the water is getting to rather critical levels.

As far as you know, has the electrical industry given any thought to the location of future power plants at some distance out in the ocean?

MR. LUCKY: The difficulty in bringing the power in is probably the major problem there, or the cost, should I say, in bringing power back into town.

MR. THOMAN: Do you know of any serious studies in regard to this?

MR. LUCKY: No, I do not. I do know that on the California coast they do use the water directly off the coast. There are no offshore generating plants, to my knowledge.

MR. THOMAN: Of course, the Pacific Coast is somewhat different from the Gulf and the and the Atlantic Coasts where we have these shelves and bay barriers.

Some years ago in the Congressional committee accounts testimony was given that probably for the future the generating plants were going to have to be in the ocean to do away with the excess heat.

What do you know about this?

MR. LUCKY: To my knowledge, we have not done this. It is more economical to use river waters and so forth than to move offshore and to transfer power in.

It also affords less difficulty with storms and such as that.

MR. WAKEFIELD: I would like to ask you if you can tell us if organic pollution in the cooling water affects your operations. Is this a cause of damage to your condenser operations?

MR. LUCKY: I might say, it would help us. From this standpoint, we do have some difficulty with shellfish and organic growth in our condensers.

As was stated in the testimony, there are multitudes of very small one-inch-diameter tubes through which the water flows. There are as many as 10,000 in one condenser.

We very frequently have to shut down to clean these tubes. Currently, we have two metals that don't stand up, and the salinity of the water that we are using during the hotter season is a considerable difficulty.

Of course, this is something we can't correct. It's not a pollutant; it's natural. We do have better metals in our forthcoming generator.

MR. TRAINA: To follow up the common concern in the economics of this, would you perhaps say that the same would be true if nuclear power sources were used?

MR. LUCKY: Naturally, we are looking at nuclear power. Nuclear power requires more cooling -- it's less efficient thermally and requires more cooling than the conventional fuel plant.

MR. JENSEN: The generation and transmission of power is just obviously vital to the life of a community and certainly to the growth of a community.

Do you have any suggestions on how a power company such as yours might best participate in this community planning process and particularly focus upon estuarine use, management and development?

MR. LUCKY: I'm supervisor of production, and this gets a little bit out of my realm. I operate the power plant.

MR. THOMAN: Sir, would you mind, if you will, tossing that question into your top management and ask them if they would give us their views on it?

MR. LUCKY: Mr. Glasscock is here with us. He is the representative of the Harrison County Development Committee, but he is also an engineer working with me, and perhaps he might -- could I call on you, Joe?

MR. GLASSCOCK: I don't know if I could give any other answers other than my own on this particular case.

MR. THOMAN: If you don't want to give any comments off the top of your head, just submit your report to us later on.

MR. GLASSCOCK: In my particular case, they are permitting me to participate in governmental affairs and the development of our economy. As you know, I presented the statement earlier that we are willing to cooperate.

I was speaking as a member of the commission with a background of private industry. We recognize that we all have a common problem here, and I think it has been mentioned once or twice before.

We have all got to reach a common denominator, and we are all willing to work toward that common denominator.

MR. THOMAN: You would probably say the participation of the electric industry would be through public-spirited citizens such as yourself participating and being encouraged to do so by your company?

MR. GLASSCOCK: Right.

MR. LUCKY: I might say, our president, Mr. Watson, is very public spirited and continues in all of these endeavors to do everything he can in this area.

MR. JENSEN: I would like to expand my question just a little bit, if I can. I said, "generation and transmission." Generation, of course, poses this problem of siting and poses a problem of hot water, and for some utilities it poses the problem of metals which have been lost from their condenser system in rather large quantities, but there are other problems in the order of transmission lines -- the concept of natural beauty.

Power lines in the wrong place can be awfully unattractive and cause some very difficult community arguments. Several big power companies have found this out recently, and this, I think, is why I asked the question about how best to bring in this power portion of our total equation on estuarine use.

It's a very real one and one in which the power companies and the community share a very vital --

MR. LUCKY: Of course, we, as an electric utility, have an obligation to the public to serve them at the lowest possible cost, and any expenditures that we might have to make will involve a cost to the company.

I mean, we are in business. That could ultimately raise -- we hate to say this -- our rates. (Laughter) We don't want to do that. We haven't raised our rates in 25 years, and we certainly don't want to.

And this is the bind we get into. It's an economic bind. Certainly, there are other ways. I mean, you mentioned offshore generation -- it's possible. It's just economically unfeasible.

Now, your transmission lines -- well, it's possible to transmit power underground, but very difficult economically.

MR. THOMAN: Thank you. We certainly appreciate your comments.

MR. JORGE E. BURQUET: I am Jorge Burquet from the Mississippi Power and Light Company, and we have a statement to make, but it is not prepared yet, and we would like permission to send it to you at a later date.

Our position is exactly like Mr. Lucky's, and we work very closely together, and I would like to say that everything he said is backed up by the Mississippi Power and Light Company.

Our statement will be by Mr. D. C. Lutken, vice-president and chief engineer.

MR. THOMAN: Is Mr. James M. Sharp present here today? He has indicated that he might wish to present some testimony.

MR. TRAINA: Mr. Sharp has asked that this statement be presented for the record. It reads as follows:

"In connection with the public meeting regarding water pollution to be held in Biloxi on January 17, 1968, I would like to present the following statement.

"I have fished at the mouth of the Pascagoula River for the past 15 years. However, during the last few years, the oil pollution has progressively increased until now it is very seldom that I do not have to interrupt fishing because of oil on the water.

"On many occasions my line has become an oily mess and I have had to wipe the line with solvent to remove the oily substance. I have yet to find a detergent that will successfully remove the oil from the sides of my skiff once it has dried.

"Unless something is done soon, it appears that the oily wastes from shipping and the waste chemicals from industry along the river banks will completely destroy what is left of our once-beautiful Pascagoula River.

"If it is within your power and authority, please help save our river. Very truly yours, James M. Sharp, Pascagoula, Mississippi."

MR. THOMAN: I would like to call on R. L. Avera, Mid-Continent Oil and Gas Association, Jackson, Mississippi.

MR. R. L. AVERA: Mr. Miller, who is vice-chairman of the committee, planned to be here and present a formal statement. However, he was unable to be here, and we would like to present this statement in writing within a 15-day period.

MR. THOMAN: We would be most happy to receive it, sir.

I would like to now call on Dr. James V. Walters from the University of Alabama, who is representing the International Paper Company.

DR. JAMES V. WALTERS: I am James V. Walters, formerly Ford Foundation engineering resident at the Moss Point Mill of the International Paper Company and now sanitary engineering consultant to the Southern Kraft Division of International Paper Company.

The Moss Point Mill of International Paper Company is the one Mississippi mill which is located on an estuary, and at this mill there has been considerable interest in water pollution control procedures over the past many years.

To give a bit of perspective of how this particular industry operation fits into the economy of the Mississippi Gulf Coast, pay rolls, materials and freight amount to approximately 35 million dollars per year.

At this installation, there has been a continuing water quality monitoring program at this installation for quite a number of years. And during the past two years, it has been my pleasure to spend a 15-month period of intensive study in the estuary adjacent to the mill.

We feel, as other people have stated here today, each of the estuaries you will consider during your study are individual. The conditions that we found were pertinent to the particular estuaries we studied, during the period of time I referred to earlier.

We further feel that the discussions about the use of this water source will best approximate the greatest economic and social use of the resource for the people in the area if it can be governed by the government.

We would conclude by saying that we support the statement of the Mississippi Manufacturers Association, which has been given earlier in the program today.

MR. THOMAN: Next, I would like to call on Mr. J. V. Colson of the Gulf-States Marine Fisheries Commission. And we are most happy, Mr. Colson, that you got over your illness and are able to attend this meeting.

MR. JOSEPH V. COLSON: I am here today to explain to you the structure of the Gulf-States Marine Fisheries Commission and a little background of it.

We are in our 19th year. It's a five-state compact, which has required legislative action of each state within the Gulf region and is by an act of Congress.

We promote such meetings as we have here today and promote research. We work with universities and the Gulf Coast Research Laboratory in Ocean Springs in trying to promote moneys, and we have made a large part in promoting a 75-percent matching fund so that each state benefits on the whole level and does their own research, you might say, along with the cooperation of the federal government.

Now, we have originally initiated a Technical Estuary Coordinating Committee of this five-state group, which is rather powerful, I might say.

We act for resolutions, and when we go to our Congressmen and our Senators and so forth with a resolution, say, on pollution, estuarine problems, well, then they do some sort of opening of their eyes, and then in turn we work with the Atlantic States Fisheries Association, which is a comparable group to ours.

So consequently, we have been able to get action, and we will, in the near future, have a meeting in Panama City, Florida. We have one every six months.

The next one will be March the 20th and 21st in one of the leading hotels in Panama City, and you are all cordially invited to attend our meeting.

We are going to have a special meeting, Technical Coordinating Committee, which will meet there. We are in the process now of producing a film of the five-state area dealing with estuaries and trying to educate the public as to the value of the estuarine areas.

This film will be restricted in the whole five-state area and will be let alone in a sense to the civic clubs and any educational facilities, universities, and so forth -- even the high school level.

So with that, we have just recently had problems with offshore pollution, and we have just requested that a questioning committee be organized in the Gulf vicinity.

We appealed to the Interior Department, and we have made a world of progress. We are at your service.

I might add this: There are a lot of people who object to what we are doing in forms of telegrams and so forth, and most people don't know what they object to, or whether they approve of what we're doing.

And I wish that in the future you would consider the source and try to get some bona-fide information or go to a technical source when you have an objection, either for or against, and get a reason why.

Just don't say, "We are against this and a part of that." This is where your group will lend a hand and try to get the right type of information too.

MR. TRAINA: Mr. Colson, being somewhat associated with the research end of our business, I was a little concerned here about the lack of discussion on the subject.

Could you comment perhaps briefly on the general areasopf research in the business of estuarine development?

MR. COLSON: Research in what?

MR. TRAINA: Research needs.

MR. THOMAN: Mr. Colson, we had invited the Mississippi universities to come in today and present testimony on what they felt the needs would be in research in the estuarine areas, and none of them have indicated that they wish to present any testimony, and I think this is what Mr. Traina is trying to elicit from you, for the management of these natural resources, what type of research is needed, what type of resources are needed to carry this out?

Are we talking about a dollar a year, a million dollars a year, or what for the Gulf Coast are we talking about?

MR. COLSON: I think you're talking about a million dollars a year. I would say this: I think that I would more or less rely upon the state agencies, such as the Mississippi Marine Conservation Commission and the Game and Fish Commission here in Mississippi, and let's make an appeal to them to be present and discuss the direction that they would like to recommend to your program.

I think that would be the sensible approach.

MR. THOMAN: We will certainly call on you, sir, to lend us a helping hand in our next meeting which is in Georgia on the 29th of February, and we have taken some direction action there in connection with the various universities in the state.

The Florida meeting is the middle of March, and nothing is scheduled beyond that except in Puerto Rico and the Virgin Islands in April.

MR. TRAINA: Does your commission establish research needs' costs?

MR. COLSON: On a state level, where we have a coordinated effort within each state around overlapping lines, they do it with these 88-309 moneys that we are getting now.

They do have research in that field. We, as I say, are a coordinated group and are not interfering with other groups. We want to work with you. That is part of our job.

MR. THOMAN: At this time, I would like to introduce to you Dr. Lloyd R. Robinson, Jr., a civil engineer from Mississippi State University.

DR. LLOYD R. ROBINSON, JR.: The Sanitary Engineering Section of the Civil Engineering Department is moving in this direction. At present, we are corresponding and working with the Sea Resources Program, the Sea Grant Program, which is being administered by the National Science Foundation for research projects along this way, and also our staff, our research facilities, and our research capabilities are available for any other assistance along this line.

MR. THOMAN: Dr. Robinson, may I ask you, if you would, could you submit a statement for the record at a later date as to what your thoughts are as to the requirements of this area?

It would be very helpful to us.

DR. ROBINSON: I would be happy to.

MR. THOMAN: I would now like to introduce Dr. George A. Rounsefell.

DR. GEORGE A. ROUNSEFELL: I am director of the Marine Sciences Institute of the University of Alabama. At the University of Alabama, we are interested in teaching, research and service.

For a while we did contract work for the State Conservation Commission, although now the state has its public law, and they have their own research now.

We want you to know that our people are interested in doing health relation aspects in marine research. When we started out last year, I had $140,000 to start with, and before the year was out, I spent $160,000.

They started me this year on a budget of $150,000. This is all academic funds. We have no support yet from the federal government, although we do have a project in one to the Sea Grant people and Water Resources Department.

But it's not a simple problem, and it's going to take a lot of basic research. And a lot of this basic research has got to be done by the universities, because they are the only outfit that has sufficient diversified talent.

You can't go out and hire, say, 12 people to do a research project. This costs too much money. These people aren't interested. They have got other jobs to do.

But these people who are in school are interested in what they are doing, and that's the way you can get most of your research done. And we need federal support.

MR. THOMAN: Dr. Rounsefell, when we have a meeting in Alabama, would you testify at that time?

DR. ROUNSEFELL: Yes, I will.

MR. THOMAN: I have no other indications on my list that anyone wishes to present any statement or be heard. If there is anyone, please come forward. If you will, identify yourself for the reporter.

MR. GEORGE W. ALLEN: My name is George Allen, and I'm with the United States Corps of Engineers. I am not representing the Corps. I wish to ask a question.

Are you going to have a meeting in the Mobile area, or is this close enough to encompass the Mobile area?

MR. THOMAN: We are planning to have a meeting in each state. We haven't set a date on an Alabama meeting.

MR. ALLEN: The next statement I wish to make is personal and not from the Corps of Engineers. For the past 10 or 15 years, I have been an estuarine manager -- physiotherapist in some respects.

I would like to ask this question from purely a personal viewpoint, making a statement that here is the State of Mississippi, and I don't know the exact mileage -- it probably affects altogether a total of I don't know how many million people.

How many people do we have in this room?

MR. THOMAN: Approximately 100.

MR. ALLEN: I would say this is a very poor representation of the number of millions of people located in this area. I know that Mr. Jensen has asked the question a number of times -- have any of these states done anything on the planning and programming of these estuaries?

Now, we all know that for years this has been one of the biggest handicaps in the estuarine program. There doesn't seem to be any planning programming, except on the part of industrial interests.

A couple of weeks ago I reviewed a plan at Mobile Bay, as a representative of the Mobile Wild Life Federation, and they have a magnificent plan, but I don't know where I'm going to sail my boat when the darned thing is finished.

And I'm just wondering, how does this group, or any federal or state agency, expect to legislate or regulate public responsibility?

You can pass federal laws, and state laws, and county laws, and city ordinances until Hades freezes over, and if people aren't interested, they will throw their noses up at you and there's nothing you can do about it.

I think we are going to have to have a big public awakening. People don't realize the value of estuaries, the intrinsic value.

There is a little town in Alabama that has a marvelous place for recreational boating. Last year the request came out that we have a sailing contest -- I'm not a stink-pot sailor, but I'm a sailor, and I have a boat that I use for family recreation, and I use it primarily for racing.

Knowing this place, I was very much opposed to having the regatta in that area. It would have meant $10,000 or $15,000 to this community, but I didn't want to put my boat hull in that filthy mess of water that they have got there.

And the very fact of this pollution deprived this community of an income of $15,000 to $20,000 -- let's say, $8000 to $10,000 -- to merchants.

To a small city, this means a great deal. But this same problem is magnified on all sizes and scales up and down the spectrum, and it's not too hard to find a problem of values of pollution aesthetically.

Now, I agree from the Outboard Boating Association about this 16-foot sanitary problem. Now, my boat is 17 feet, four and a half inches, and there's a lot of us.

Now, our rest-room facilities -- stand to the leeward side of the rail.

This problem of recreation sanitation is not very significant, but unfortunately, it's significant where it exists, because it's in highly concentrated areas, and many of these concentrated areas in Alabama are right over oyster beds, and this very well could create a problem.

We realize this, and I certainly think something should be done, but I think it's an overall problem.

MR. THOMAN: Thank you very much, Mr. Allen. I would comment that Congress, in its infinite wisdom, has directed that this study be made and to give all interested groups an opportunity to be heard, and maybe we have failed in not publicizing this meeting widely enough.

Invitations were sent to about 160 groups, individuals, companies and this type of thing. There were items in the press last week about it. And frankly, we are learning too.

Already, for our Georgia meeting, we have sent out many, many more invitations of somewhat a different type, and as we move in on this, we hope that the interested groups will come forward with suggestions so that they can be presented to the Congress and that Congress can thoroughly chew them over and come up with some sort of a national policy on this.

I believe that the Congress is seriously concerned about orderly development. I think they want to know the best way to do this. And our charge in the law is very explicit that we are to give them the best thinking of everyone that is willing to come in and tell us what they think, and I personally appreciate all of you coming here today and participating in this with us.

Does anyone else have anything?

MR. WOOD: I just want to express the appreciation of the State Pollution Control Commission for those of you who have come here and made what information you have available, and your attitudes and all.

And I also want to repeat what Mr. Thoman said at the beginning and to clarify what may seem to be a lack of interest on the part of the state by our silence: This was a meeting particularly for agencies and commissions, other than state agencies and commissions, and individuals to make themselves known.

As Mr. Thoman said, our director had been appointed by the governor as a coordinator for the state agencies. We have been in touch with each state agency, and we will be in touch with them again, if we have overlooked any state agency who is interested in the field.

We would appreciate your sending your information or your statement to us, and we will submit something to the Federal Water Pollution Control Administration during the next two weeks.

MR. THOMAN: Again, please accept my personal, sincere thanks for being here. I want to remind you again that the record will be open for 15 days from this meeting for any reports that you might wish to send in.

The meeting is adjourned.

(Whereupon the meeting adjourned at 12:00 o'clock noon.)

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APPENDIX I

REPORT OF THE POLLUTION STUDY COMMITTEE

NATIONAL ASSOCIATION OF STATE BOATING LAW ADMINISTRATORS

NOVEMBER 8, 1965

WARWICK HOTEL

PHILADELPHIA, PENNSYLVANIA

REPORT OF THE POLLUTION STUDY COMMITTEE, NATIONAL ASSOCIATION OF STATE BOATING LAW ADMINISTRATORS

November 8, 1965

At the Oklahoma City meeting of the National Association of State Boating Law Administrators, held November 18-20, 1963, a Committee was appointed to develop a report on the nature and extent of pollution of the waters of the United States by recreational watercraft and to make recommendations relative thereto. The following were appointed as members of this Committee:

CHAIRMAN

Keith Wilson, Director, Michigan State Waterways Commission

MEMBERS

Bernard W. Chalecki, Director, Connecticut Boating Safety Commission
Peter J. Gannon, Chief, New Jersey Bureau of Navigation
John Grenoble, Member, Pennsylvania Fish Commission
DuWayne Henrie, Boat Registration Section, Arizona Highway Department
Milton Johnson, Director, Minnesota Boat & Water Safety Division
James J. O'Brien, Director, New York Division of Motorboats
Wilton Vaugh, Director, Massachusetts Division of Motorboats
Ron Stone, Government Relations Department, Outboard Boating Club of America

A review of information provided to the Committee by the Outboard Boating Club of America indicated a reason for the concern of the Association in this area. According to OBC, a total of 23 states have already adopted legislation controlling the discharge of sewage from recreational watercraft on some or all of the individual state's waters, while many other states are considering such action. These totals include only states specifically legislating on this subject and do not include those states which may have passed laws dealing with trash, garbage, litter, etc.

The approach to this problem by the various states appears to be characterized by its individuality. In almost every instance, the boat pollution laws adopted by one state have little or no resemblance to those adopted by others, even in the case of neighboring states. Legislation involving varying and differing standards presents a considerable problem to the boatman who wishes to use his boat in a number of different states.

Further complicating the picture is the propensity on the part of the individual states to select one type of anti-pollution device and to permit only its use in the particular state. Whether this is done deliberately or in ignorance of the existence of other equally suitable devices is not known. In any event, it further complicates the mobility of boats cruising on the waters of more than one state.

STUDY METHOD

In view of the extensive activities in the various states on this subject, it was concluded by the Committee that there must be available a number of detailed studies analyzing the extent of pollution of waters by recreational watercraft. Accordingly, the first action of the Committee was to attempt to gather together all such reports to permit an analysis of the nature and extent of pollution by recreational watercraft of the waters of the United States.

An extensive survey of Federal agencies and of agencies of all of the states was made to locate such reports. This survey resulted in turning up only two reports that dealt in any manner with this problem. One report dealt with the effect of pollution from houseboats in the vicinity of Portland, Oregon, and was prepared by the Oregon State Sanitary Authority.

The second report, entitled "Survey of Marina and Watercraft Use in Relation to the Public Health Aspects", and jointly prepared by the Macomb County Health Department and Michigan Department of Health, dealt specifically with this problem.

Because of the inability of the Committee to assess the nature and extent of pollution by recreational watercraft from only two reports made in widely separated parts of the country, an alternative method of assessing this problem was developed. This was by means of a questionnaire designed to elicit responses from boating, health, and recreation officials throughout the country from which conclusions could be drawn. The questionnaire is reproduced as Appendix A.

The questionnaire was mailed to some 200 agencies in and out of government, both state and Federal, including public health departments, water pollution control boards or commissions, state boating law administrators, and virtually every Federal agency having any connection with waters used for recreation. A cover letter was provided with the questionnaire explaining the desire of the Committee to determine whether or not recreational boating is a significant contributor to the water pollution problem, and requesting the assistance of the addressee. The returns were most gratifying and extremely helpful. More than 90 replies were received representing one or more agencies in almost every state. A list of the agencies responding and a summary and analysis of the replies received is reproduced as Appendix B.

In the course of its study, the Committee collected a large number of newpaper clippings, magazine articles, and similar releases dealing with this subject. Many of these articles and clippings were especially helpful and presented insights into the over-all problem under study. Reproduction of these articles is not feasible, but several of those considered by the Committee are as follows: "Boat Sanitation" by Elbert Robberson, Yachting magazine, October, 1964; "Federal Policy Proposed on Disposal of Wastes", The Waterways Journal, July 11, 1964; and "Water Pollution from Boats", Boating Industry magazine, January, 1964.

THE EXTENT OF THE PROBLEM

The two reports dealing with pollution from houseboats and recreational watercraft were carefully reviewed by the Committee, because they were the only such reports located. An evaluation of the Oregon State Sanitary Authority Report on Houseboats is very well summarized by the conclusions stated therein and appearing on page 10 of the Report:

> "1. Domestic wastes including garbage from approximately 294 houseboats are dumped without treatment into the Willamette and Columbia River in the vicinity of Portland. This represents a population of between 500 and 1,000 persons. Inclusion of boathouses, marinas, and other waterfront facilities would increase this number somewhat.
>
> "2. The measurable organic and chemical pollution load from houseboats in the Portland area is relatively small compared to the total pollution load discharged from all sources.
>
> "3. Aesthetic nuisance conditions resulting from floating materials and health hazards from pathogenic organisms are considered to be the significant pollutional factors involved.
>
> "4. Collection and adequate disposal of houseboat wastes can be accomplished with reasonable application and modification of present equipment and techniques.
>
> "5. All but one or two houseboats in the lower Willamette River are located at established marinas, in groups of 20 or more, which are within reasonable pumping distances of city of Portland sewers.
>
> "6. All but 10 or so houseboats in the Columbia River, adjacent to the Portland area, are in groups of 5 or more and subject to service by group facilities.
>
> "7. The requirement for treatment of wastes from houseboats and boathouses would make it possible to require installation of holding tanks on boats which could be pumped out for a nominal fee at practically any marina or moorage along the River.
>
> "8. It is believed that the collection and treatment of disposal of wastes from houseboats and boathouses could be required and enforced under existing state statutes and regulations."

The significant conclusions are contained in paragraphs 2 and 3 where it is noted that the pollution load from the subject craft is relatively small compared to the total pollution load from all sources but that a nuisance and health hazard is created by floating wastes. The extent of the health hazard could undoubtedly be debated at considerable length, but the nuisance factor of floating waste materials cannot be refuted. It is to be noted that no mention of trash, litter, or similar materials is made in the report.

The Michigan Report resulted in conclusions very similar to those of the Oregon Report. The complete Summary and Conclusions can be found on page 23 of the Report and only selected paragraphs are reproduced here:

> "2. While the study was designed to obtain data relative to sewage pollution and sanitation conditions at marinas it was evident from statements made under the item 'comments' on the questionnaire that there was great interest in watercraft safety (reckless driving, operator training, and operator licensing) and pollution other than sewage, i.e., trash, garbage, beer cans, wood or other floating debris.
>
> "3. The bacteriological sampling program showed that the water quality at six of the fourteen stations was extremely variable with high coliform concentrations a significant percentage of the time. The eight remaining stations showed a water quality quite variable but with coliform concentrations under 2500 for 95% of the time and no statistically significant difference detectable among these stations. The water quality at all stations was so variable that there was no statistically significant difference between any two stations or groups of stations. It was therefore not possible to measure the effect of pollution which might be contributed by a marina area into adjacent waters whether this be a stream or along the shoreline of a lake.
>
> "4. The stations which showed the highest chloride concentrations also showed some of the highest biochemical oxygen demand concentrations and in nearly the same order, namely (4, 5, 1, 2, 8, and 3) and (5, 4, 1, 2, 8, and 3) respectively. Concentrations actually decreased from a point on the river above the marinas to a point on the river below the marinas. The opposite trend would be anticipated if pollution from marina areas which might be detected by a sampling program was contributing a significant pollution load to the receiving stream in relation to pollution already in the stream as measured by these parameters."

The report also concluded, through the process of deductive logic, that raw sewage was being discharged from recreational watercraft:

> "8. Observations of watercraft use while away from home port indicate the majority of one day trips cover from 3-1/3 to 7 hours on the average and it is evident that the head would be used under these extended use conditions. Since the high percentage of watercraft now in service are not equipped with holding tanks for sewage or macerator chlorinator devices, raw sewage is being discharged into the waters of the state from watercraft."

The Michigan Report made no recommendation or reference to the nuisance and/or health hazards created by floating wastes, nor was any reference made to trash, garbage, and litter, even though the Report did mention that great interest in these matters was evidenced by the completed questionnaires gathered as a part of the Report. Both reports concurred in the fact that the pollution load attributable to houseboats and recreational watercraft was relatively small and, in fact, could not even be measured in Michigan. Both also concluded that raw sewage was being deposited in the water from these craft.

An analysis of the questionnaires returned to the Committee established the fact that very few officials believed that pollution attributable to recreational watercraft was much of a problem. The results of the questionnaire are summarized in Appendix B but it should be noted that an average of all answers indicated that trash disposal from recreational watercraft was the greatest problem, followed by sewage, garbage, and waste, in that order.

The Committee also reviewed such information as was available to determine the number of recreational watercraft within their various registered fleets that actually possessed marine toilets. Inasmuch as no statistical data was available on this subject, it was necessary to resort to estimates. It was concluded, after careful analysis, that a maximum of 10% of the recreational watercraft of any one state contained marine toilets and that the national average would probably be less than 5%. Necessarily, the craft with marine toilets were the larger craft which are generally located on coastal and Great Lakes waters rather than on small land-locked lakes.

The general use patterns followed by owners of recreational watercraft were also noted. It was found that only a very few watercraft were used for any extensive periods of time as dwellings but that, rather, most use was concentrated on weekends, holidays, and during summer vacations. Further, the boating season of most states was found to be rather limited with the exception of the southern, southwestern, and western states. As an example, it was noted that in Michigan the boating season is regarded as extending from May 1, to November 1, a period of six months, but that virtually all boating use was confined to the months of June through early October. Even if it was assumed that 10% of all recreational watercraft in Michigan contained marine toilets, that six persons were regularly utilizing the watercraft, and that the average boat was in use in one form or another for 60 days per year, the extent of pollution attributable to these craft would certainly have to be classified as negligible.

COMMITTEE FINDINGS

From the two health reports on this subject that were turned up by its research, from the results of its questionnaire survey, and from the results of its own independent analysis, the only conclusion that can be reasonably established and logically defended by this Committee is that pollution from recreational watercraft is, at most, negligible. This pollution is so slight on the total scale of pollutant sources that it is, at this time, unworthy of the considerable attention it has been given.

To support the finding of this Committee as to the relative insignificance of pollution from recreational watercraft, the Committee draws the reader's attention to a report on pollution of the Detroit River and Lake Erie, released by the U. S. Public Health Service on May 8, 1965. The report resulted from a two and one-half year study by the Public Health Service of these waters and found that pollution had reached a stage hazardous to human health, fish, wildlife and recreation. The report further claimed that 1.6 million gallons of waste flows into the Detroit River annually, "one-third from municipalities and two-thirds from industries." The report charged that the Scott Paper Company alone discharged wastes "equivalent in oxygen-consuming capacity to the untreated sewage from a population of over 800,000 persons."

The report recommended "correcting the pollution from six municipalities, 42 industrial establishments, and three Federal installations" and estimated the cost of remedial measures at $200 million. The subject is still under debate in Michigan and promises to be actively discussed for many years before the situation outlined in the report is corrected, if ever.

Based on the assessment by the Committee of the total boating population in this country with marine toilets, the patterns of use of such craft, and the total days per year they are in operation, it is the opinion of this Committee that the pollution of the Detroit River which is caused by municipalities and industries is of greater national concern than such pollution as is caused to the nation's waters by the total recreational boating fleet of this country.

But if the Committee is correct in its conclusion, then how can the vigorous legislative activities in this field on the state level and, now, on the Federal level, be explained? The only explanation available to the Committee is that curbing whatever pollution is attributable to recreational watercraft is considered to be reasonably easy, and is therefore a good place for health officials wishing to make a start in this field to begin. Further, because such legislation affects a relatively small percentage of the population of a given state and because the goal of the legislation is admittedly for the good of all, it is difficult for those opposed to such regulation or the form it takes to gain any appreciable support for their position.

If this has been the source of the considerable legislative activity on this subject in the past, then it is the inescapable conclusion of this Committee that it will continue to be in the future. That such legislation can and often does impose incalculable and unnecessary hardships on recreational boat owners hasn't deterred such efforts in the past and is unlikely to be of greater significance in the future.

The Committee predicts that legislation prohibiting entirely the use of a marine toilet on the waters of a given state will continue to be passed in the future as it has in the past, even though no action of any consequential nature is taken by the same state to clean up the heavy pollution of its waters caused by municipal and industrial wastes.

What can and should recreational boat owners or the National Association of State Boating Law Administrators do to correct this situation? Should we oppose each and every attempt to curb such pollution as can be attributed to recreational boating because it is of such insignificance in the total pollution picture? Should we advocate a total program to correct all pollution as an alternative to regulations covering boating alone? Or should the Association continually refer to this report and its conclusions in hopes that this alone will reduce legislative activity in this field?

Reasonable though any of these courses of action may appear, it is obvious that none of them will result in action favorable to recreational boat owners. Legislating against pollution in any form is gaining popularity, and opposing anti-pollution legislation or regulations is comparable to opposing motherhood or the American flag. The situation has passed the point where reasonableness is a criteria so that concerted opposition to such regulation by recreational boat owners or groups representing them, regardless of the facts in their favor, will accomplish nothing constructive and might even result in the adoption of harsher regulations than would otherwise be the case.

The Committee believes that what must be done by this Association and by other recreational boating interest groups in the country is recognize that regulation of this problem, regardless of its significance, is certain to continue; that

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such regulations will continue to vary considerably from state to state; that many, if not a majority, of the regulations in this area will be of the type completely prohibiting the discharge of wastes in any form, whether treated or not, from marine toilets; and that such regulations will be injurious to the mobility of recreational boating that this Association is attempting to foster in other fields.

If this is so, then what can be done to amend or modify these regulation so that they are less injurious to recreational boat owners and to the mobility of recreational craft? The solution suggested by the Committee is the preparation of a model law on this subject that will avoid the shortcomings of most of the present regulations and still alleviate the problem of the discharge of untreated wastes from recreational watercraft.

Before such legislation can be effective, however, there must be available anti-pollution devices capable of installation on recreational craft at a reasonable cost. An assessment of such devices is then necessary.

ANTI-POLLUTION DEVICES FOR RECREATIONAL WATERCRAFT

There are three principal types of treatment devices now available:

1. Chlorinators. Chlorinators are devices designed to hold sewage for at least a nominal period of time to permit introduction of dosages of disinfectants to kill bacteria contained therein. To meet any reasonable health standard, such units must be equipped with a macerator or with some other type of agitator which will cause the breakup of solids to permit disinfection and to inhibit settling of solids in the chlorinator.

2. Incinerators. These units are designed to trap the waste material, generally in a previously inserted bag, and to hold the materials until the device is activated. Upon activation, the bag with the sewage materials is dropped into a burning chamber where it is consumed by a burner which is ignited by turning the burning control as prescribed. These units are usually provided with exhaust fans to remove odors from the area to over-board vents. Generally, appropriate controls are provided to assure that the device cannot be activated when the toilet is in use.

3. Holding Tanks. A holding tank is simply a waste tank placed on board the vessel and attached to the marine toilet so that all materials are pumped from the toilet into the tank. Such devices can be emptied in one of two ways; the first through a pump attachment which empties the tank into a shoreside sewer or septic tank and the second by pumping the materials directly into the waters of the lake.

Each of these units has some disadvantages which should be mentioned.

1. Chlorinators. An "Evaluation of Marine Toilet Chlorinators" is a report prepared by Syracuse University in 1962 for the New York State Department of Health and contains some excellent suggestions relative to the use of chlorinators. This report as well as the experience of others in using chlorinators indicates that the devices must retain the waste materials for a minimal period of time to assure adequate treatment by the disinfectant used with the device. Also, should the boat owner allow the disinfectant source to become depleted, there is no way that the unit can be designed to continue to hold the materials until a disinfectant is introduced. It is believed that this situation could be greatly alleviated simply by having manufacturers of

such devices print on the devices themselves or on literature designed to be placed in the head of a boat, instructions as to its use. It is not considered probably that many boat owners who have had these units installed will permit them to be regularly operated in a manner designed to destroy their effectiveness.

2. Incinerators. The principal objections to units of this nature relate to their size and to the fact that most use propane gas as fuel. In other respects, they are considered to be the most effective anti-pollutant device because they destroy the wastes entirely. Although the size limitation cannot easily be modified, the danger of introducing propane gas on board a boat can be almost completely reduced by a carefully designed and proper installation of the unit and the fuel bottles.

3. Holding Tanks. Units of this nature seem to have the greatest appeal to health officials, probably because they are regarded as the next best thing to acually sealing a toilet. However, these installations are not without disadvantage. If holding tanks are to be pumped ashore, relatively expensive sewer installations at marinas are required. If they are to be emptied in outlying waters, the possibility of their being discharged at dockside will continue to exist, and should such happen, would completely negate the installation of the device. Holding tanks also require considerable space on board boats where space, regardless of the size of the boat, is always limited. Holding tanks should have chemicals added from time to time to reduce the increased bacteriological effects of retaining sewage for prolonged periods of time. The longer such materials are retained without the introduction of appropriate chemicals, the more virulent the waste materials become. However, it is believed that with the provision of appropriate instructions to the user, any boat owner utilizing such an installation will assure that it is used properly.

Although there are disadvantages to each of these units, it is not felt by the Committee that these are such that the only alternative to continued pollution is the sealing of toilets. Certainly these units will perform with no less effectiveness than the average municipal sewage treatment plant, and because of the boat owner's interest in unpolluted waters, it is believed by the Committee that the units will be carefully and properly maintained and operated.

It is therefore the conclusion of the Committee that suitable and adequate devices are presently available for installation aboard recreational watercraft that will treat sewage to a standard acceptable to most health officials. Since any of the three units above are acceptable treatment devices, and since the selection of one of the three by a boat owner will be based on personal considerations, it is recommended that a model law permit the use of any of the three devices.

MODEL LAW

After concluding that suitable anti-pollution devices were available for installation on recreational watercraft, the Committee requested the Outboard Boating Club of America to prepare a model law dealing with the general subject of pollution from recreational craft. This model law has been extensively reviewed by the Committee and others, and suggested revisions or modifications incorporated into the final draft which is included in this Report as Appendix C. This model law provides for several features that are worthy of individual mention.

To assure that the standards required by such legislation do not vary from state to state, they have been incorporated into the model act as a part thereof. This is most important, for one of the principal justifications of this model act to the Committee has been that adoption thereof nationally would greatly facilitate the mobility of recreational craft. If individual standards could be established by each state, this mobility would be completely destroyed and the purpose of the act entirely negated.

The Committee was also impressed by testimony of manufacturers of anti-pollution devices wherein they pointed out to the Committee that the trend in current legislation was to require a complete laboratory test of every anti-pollution device by its manufacturer before the unit would be accepted by the particular state. In an effort to reduce this expense to the manufacturer, and to avoid duplicate tests of an almost identical nature, the Committee has permitted the manufacturer in the model law to certify in writing on the basis of any test which the manufacturer makes of its unit, whether or not the unit meets the requirements of the model act.

In other respects, the model law has been drafted in such a manner as to assure that it can easily be used without major amendments in any State in the country. This was, of course, done intentionally in hopes that the goal of uniformity in this legislation would be further accommodated.

LITTER

During its investigations, the Committee was impressed with the number of persons who, when discussing pollution from recreational watercraft, were concerned only with the depositing of trash, garbage, and other materials in the water which, perhaps, could be more appropriately termed "litter". Before receiving the results of its questionnaire survey, it was the personal opinion of most of the Committee members that the littler problem was of greater concern than the problem of pollution, and the questionnaire results confirmed this belief.

American ingenuity being what it is, it appears that food and beverage containers are becoming more and more indestructible. Milk cartons, beverage cans and bottles, and other food containers are not only extremely resistant to deterioration through exposure to the elements, but most of them float, resulting in their accumulation on the beaches adjacent to heavily used waterways. Even when the items washed up on the beach are not necessarily dangerous to humans, they offend the senses because they are so foreign to the area. Since they do not appear to naturally waste away and since they are not capable of being eaten by fish, fowl, or wildlife, the only way they can be removed is through human action and such is difficult, if not impossible, when the cost of patrolling the thousands of miles of shoreline of this nation is considered.

This does not mean that recreational boat owners are the primary offenders in this area. There is no question in the Committee's mind that a substantial amount of this litter is being deposited by the crews of commercial vessels plying these waters. Because such crews eat all meals on board and naturally consume a far greater amount of foods per person than is consumed by recreational boat owners who, although greater in numbers, cruise much less and appear to eat on board less frequently, it is apparent that the continued practice of dumping all waste materials over the side into the waters will result in a large accumulation of litter on the beaches.

The litter problem is not easily resolved simply by passing legislation. This is a problem which can only be resolved through a direct attack utilizing all possible means to educate every segment of the public as to the problem and its likely effects if not abated. Appropriate legislation can be helpful, however, to ensure that marinas and public boating facilities provide trash receptacles and that commercial vessels are required by law to destroy materials through incineration or to place them in trash receptacles for disposal on shore. Because of this, provisions of this nature are included in the model law recommended herein by the Committee.

IN CLOSING

The Committee has attempted to maintain an objective approach to the problems covered by this report. As more and more evidence was uncovered indicating the miniscule nature of the pollution problem and the gargantuan efforts being made by persons who should know better to correct it, the objectivity of the Committee lessened considerably. Still, we believe we have well and amply supported our conclusions herein.

The Committee was appalled at the tremendous amount of industrial waste and untreated sewage being regularly deposited in the lakes, streams and rivers of this country. Although it was gratifying to the Committee to establish to its complete satisfaction that virtually none of this pollution was the result of the use of recreational watercraft, this limited satisfaction was completely overwhelmed by the staggering knowledge of the condition of much of our water. Indeed, unless much stronger efforts to correct this situation are made in the future than have been made in the past, there may well be no recreational watercraft in existence to worry about because no waters suitable for recreation will remain.

APPENDIX A

QUESTIONNAIRE ON WATER POLLUTION BY RECREATION WATERCRAFT

QUESTIONNAIRE ON WATER POLLUTION BY RECREATIONAL WATERCRAFT

Completed by

NAME ____________________

REPRESENTING ____________________

ADDRESS ____________________

The object of this questionnaire is to try to develop information and data on the extent of water pollution attributable to recreational boating, whether or not such pollution is a significant factor, and the nature and measure of corrective action to be, if any, which will provide a remedy without unduly penalizing the boat owner.

For purposes of this study, the term "recreational watercraft" is defined as every description of vessel, regardless of method of propulsion, which is used or capable of being used as a means of locomotion on the water for recreational pursuits.

1. Can you estimate, from boat registration data or any other appropriate source, the number of recreational watercraft in your State with marine toilets? Yes ____ No ____

2. If the answer is "Yes", please indicate in the following space how many recreational watercraft with marine toilets you estimate to be operating on waters in your State. ____________________

3. If your area of jurisdiction is defined other than by state boundaries, please explain and, if possible, estimate the number of recreational watercraft with marine toilets in your area. ____________________
____
____

4. Can the total number of recreational watercraft with marine toilets in your State or area be broken down according to boat size? Yes ____ No ____

5. If the answer is "Yes", please indicate in the spaces below the number of recreational watercraft with marine toilets in your State or area in each of the following size groups:

__________ Less than 26 feet in length
__________ 26 feet to less than 40 feet in length
__________ 40 feet to not more than 65 feet in length

6. If you have a numerical breakdown of recreational watercraft with marine toilets classified other than by size or length of the vessel, we would appreciate having this information. Please show any such data in the following space: ____________________
____
____

7. Can you estimate the number of recreational watercraft without marine toilets in your State or area? Yes ____ No ____

8. If the answer is "Yes", please indicate how many. ____________________

9. Below are listed the types of water, some or all of which may exist in your State or area. Please mark the degree and kind of pollution FROM RECREATIONAL CRAFT ONLY on your waters.

Mark the degree of pollution by circling #1, 2, 3 or 4. For example, on rivers and streams, sewage and/or garbage, trash and waste FROM RECREATIONAL CRAFT are possibly contributing to pollution. If, in your State or area, sewage is a MAJOR contributor to pollution, circle #1; if MODERATE, circle #2; if a MINIMAL contributor, circle #3; if it does NOT contribute, circle #4. Do the same with garbage, trash and waste, marking the degree of each in each type of water.

	SEWAGE	GARBAGE	TRASH	WASTE
EXAMPLE: RIVERS AND STREAMS	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4

DEFINITIONS

Sewage: The contents of a drain, expecially human excrement.
Garbage: For example, animal or vegetable matter from a kitchen, market or store.
Trash: Something discarded as no longer useful or not useable, especially paper, metal, wood, glass or plastic products.
Waste: Material lost or unused during a process, leakage, e.g., motor oil.

KEY

1 Circling this number means that the kind of pollution listed is a MAJOR contributor to pollution in your area.
2 Circling this number means a MODERATE contribution to pollution
3 Circling this number means a MINIMAL contribution to pollution
4 Circling this number means NO contribution to pollution

TYPE OF WATER	KINDS OF POLLUTION			
	SEWAGE	GARBAGE	TRASH	WASTE
COASTAL OR OCEAN	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
GREAT LAKES	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
INLAND LAKES				
Under 500 acres	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
500 acres or over	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
RIVERS AND STREAMS	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
RESERVOIRS	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4

10. How is the problem of pollution from recreational watercraft being handled in your State or area: by regulation? ___ by education? ___ otherwise? ___ Please elaborate. ___

11. Do you have any suggested solutions over and above what is already being done to combat pollution from recreational watercraft in your State or area?

12. To your knowledge, have any studies been made in your State or area regarding contribution to the water pollution problem by recreational watercraft? Yes ___ No ___ (In answering the foregoing, you may include studies by public health or water pollution agencies of Federal, state or local government, and/or studies by universities and private research organizations or any other studies of which you may know.)

If the answer is "Yes", and copies of these studies are available in your files, we would greatly appreciate your sending one of each to us along with this completed questionnaire.

If extra copies of these studies are unavailable to you, it is requested that you furnish all appropriate names and addresses where we can write for copies of such studies. Please give these sources of information in the space provided below.

13. In your opinion, are boating groups and individuals self-policing in efforts they make to keep the water clean and shoreside areas clean for their own sake? ___

14. Do you think marinas are contributing to water pollution by lack of adequate facilities at docking and mooring areas to remove sewage from boats or garbage and trash deposited in the water? Yes ___ No ___ Please comment

15. Additional comments, if any ______________________________

PLEASE RETURN THIS QUESTIONNAIRE, UPON COMPLETION TO:

OUTBOARD BOATING CLUB OF AMERICA
307 NORTH MICHIGAN AVENUE
CHICAGO, ILLINOIS 60601

WESTERN UNION

[illegible] AY [illegible]

[illegible] FDA HEARING

[illegible] HOTEL BILOXI [illegible]

THIS ORGANIZATION SUPPORTS YOUR EFFORTS
COMPLETELY WE ARE SORRY THAT I CANNOT [illegible]
STATEMENT WILL FOLLOW=
ELIZABETH M WALLACE DIRECTOR OYSTER
INSTITUTE OF NORTH AMERICA=

Reproduced from best available copy.

Telefax WESTERN UNION Telefax 70<

[illegible] NF WASHINGTON DC [illegible]

[illegible] WRIGHT EXECUTIVE SECRETARY

MISSISSIPPI AIR AND POLLUTION CONTROL

COMMISSION BROADWATER BEACH HOTEL

I AM INDEED SORRY THAT OTHER COMMITMENTS PREVENT ME FROM ATTENDING YOUR CONFERENCE TO DISCUSS ESTUARINE PRESERVATION AND DEVELOPMENT PROBLEMS. I AM VERY MUCH

Telefax WESTERN UNION Telefax

BW1 PAGE 2 OF 2

INTERESTED IN THIS SUBJECT AND WISH FOR YOU A SUCCESSFUL CONFERENCE. I HOPE YOUR WILL BE ABLE TO PROVIDE ME WITH A COPY OF THE PROCEEDINGS. REGARDS=

JAMES O EASTLAND UNITED STATES SENATOR=

130A

WILLIAM M. COLMER
5TH DISTRICT, MISSISSIPPI

COMMITTEE ON RULES

WILLIAM M. COLMER, MISS., CHAIRMAN

RAY J. MADDEN, IND.
JAMES J. DELANEY, N.Y.
RICHARD BOLLING, MO.
THOMAS P. O'NEILL, JR., MASS.
B. F. SISK, CALIF.
JOHN YOUNG, TEX.
CLAUDE PEPPER, FLA.
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H. ALLEN SMITH, CALIF.
JOHN B. ANDERSON, ILL.
DAVE MARTIN, NEBR.
JAMES H. QUILLEN, TENN.
DELBERT L. LATTA, OHIO

Congress of the United States
House of Representatives
Washington, D.C.

January 9, 1968

Mr. Eugene T. Jensen, Chief
Office of Estuarine Studies
Department of Interior, FWPCA
Washington, D. C. 20242

My dear Mr. Jensen:

Thank you for this opportunity to make this comment at the Public Meeting to discuss estuarine preservation and development problems.

Having lived near or on the Gulf all of my life and knowing of the values of the estuaries of Mississippi, I am most concerned with both the development and the conservation of these areas to bring to full realization their potential benefits for the people of this State.

You may certainly be assured of my deep interest in the work of the National Estuarine Pollution Study. I am gratified that the Mississippi Gulf Coast was chosen as the site of the first of a series of public meetings to explore estuarine problems.

I shall look forward to receiving a copy of the proceedings for this January 17 meeting and such recommendations for development of this part of the State of Mississippi as they become available in the future.

With best wishes for a most successful meeting, I am

Sincerely yours,

Wm. Co

OYSTER INSTITUTE NORTH AMERICA
MEMBER

Mrs. David H. Wallace, Director
Area Code 516 LT 9-2435
22 Main Street ● Sayville, L. I. ● New York 11782

TESTIMONY

FWPCA HEARING
Biloxi, Mississippi
January 17,1968

The officers and members of the Oyster Institute of North America wish to be on record in support of the combined efforts of the conservation, health and pollution abatement agencies of Mississippi with the comparable federal agencies which are striving to understabd, restore, and preserve the estuarine areas. We strongly recommend that the responsibilities of each division be well defined in relationship to the others so that Mississippi can reclaim the Pascagoula and Biloxi Bays for food production. As the national trade association representing the producers, processors, and distributors of oysters and clams, we believe that full utilization of all marine food resources is of enormous importance to each state.

It is most fortunate for the nation that the Water Quality Act of 1965, Section 10 d, made shellfish an indicator organism of pollution. Compliance with PL88-234 will guarantee that waters producing food will also provide the many other beneficial uses of our marine resources. If the estuaries are destroyed by dredging and filling--or contaminated with toxic industrial wastes, there will be no seafood. Should domestic wastes pollute the waters, the seafood will be unfit for use. In each of these instances, most of the other beneficial uses are destroyed as well. The beaches become undesirable (or unhealthy) for bathing and water sports; boating becomes unpleasant (thus no need for marinas and boat channels); the very reasons persons buy high-priced real estate to live near the water and will submit to high taxes for the privilege is destroyed because the reasons for living near the water are cancelled.

Mississippi is no different from any other state. Each has a people problem, whose very presence causes deterioration of the environment resulting in additional closing each year of water bottoms for oyster harvesting. In 1967 Mississippi closed another 400 acres, 180 of them in the Biloxi area. This trend must be reversed. In several of the mid-Atlantic states this has already happened. Areas formerly closed in the Chesapeake Bay and the Long Island Sound are restored to shellfish production with improved sewerage disposal systems and/or a comprehensive approach to pollution abatement -- which this hearing is all about.

(continued)

As a result of the nationwide grass roots demand to clean up the waterways, industries are accepting the obligation that the price of industrial products must reflect the costs of any waste disposal. This can be the most direct, and thus the most economical, approach.

Communities along waterfronts must plan their utilities in advance to include acceptable drinking water and sewerage systems. The two are interrelated in tidewater areas.

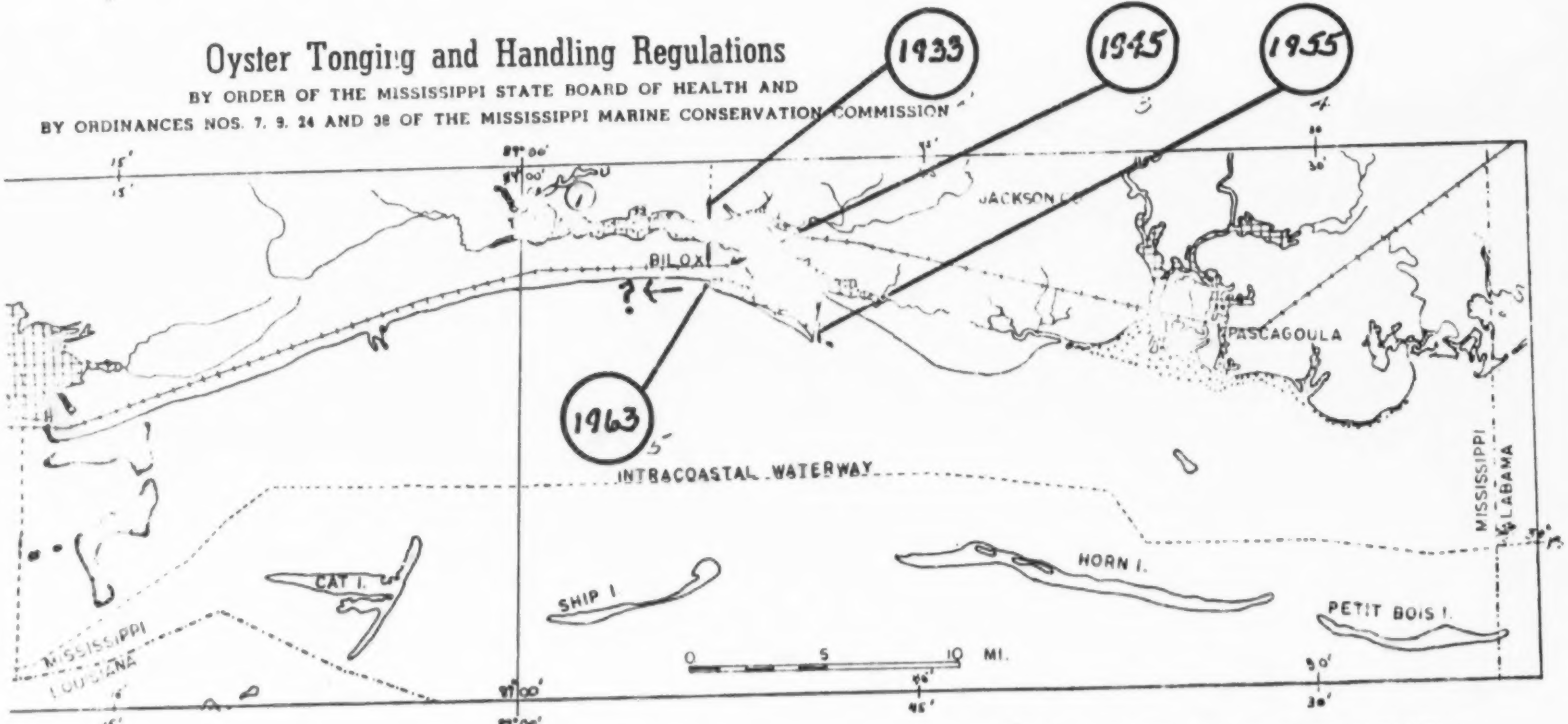
The National Register of Shellfish Growing Areas for 1966 is submitted herewith for your appraisal of Mississippi's potential in relation to areas fully approved for harvesting shellfish. Tables I and II on pages 2 and 3 are especially relevant. It is no longer acceptable just to close areas when the water quality deteriorates. Our industry depends upon public confidence that our products are clean. The best guarantee is to restore and preserve acceptable standards for all of our waters.

The Pascagoula Incident in 1961 dealt the nation's oyster industry a shattering blow. The failure of that sewerage plant continues to plague us with adverse publicity. It must never happen again.

The most intelligent course is to control and abate pollution so that the waters are safe to be used. To permit the estuaries to be receptacles for waste products is folly. Only one use is then possible. The beneficial uses--food, recreation, and aesthetics--are lost.

Oyster Tonging and Handling Regulations

BY ORDER OF THE MISSISSIPPI STATE BOARD OF HEALTH AND
BY ORDINANCES NOS. 7, 9, 24 AND 38 OF THE MISSISSIPPI MARINE CONSERVATION COMMISSION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PASCAGOULA
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...ay 18, 1961,

All of the area that lies within the boundaries formed by a line running from Biloxi Lighthouse southward to Biloxi Channel Marker "10", thence eastward following the meanderings of the north shore of Deer Island to east end of Deer Island, thence northeastward to Marsh Point, including Davis Bay, is closed to taking or catching oysters.

GRAVELINE BAYOU and GRAVELINE BAY will be open until further notice of this commission.

All reefs between Graveline Bayou and Bayou Cassotte will remain CLOSED. This includes the reefs at the West River and East Pascagoula River.

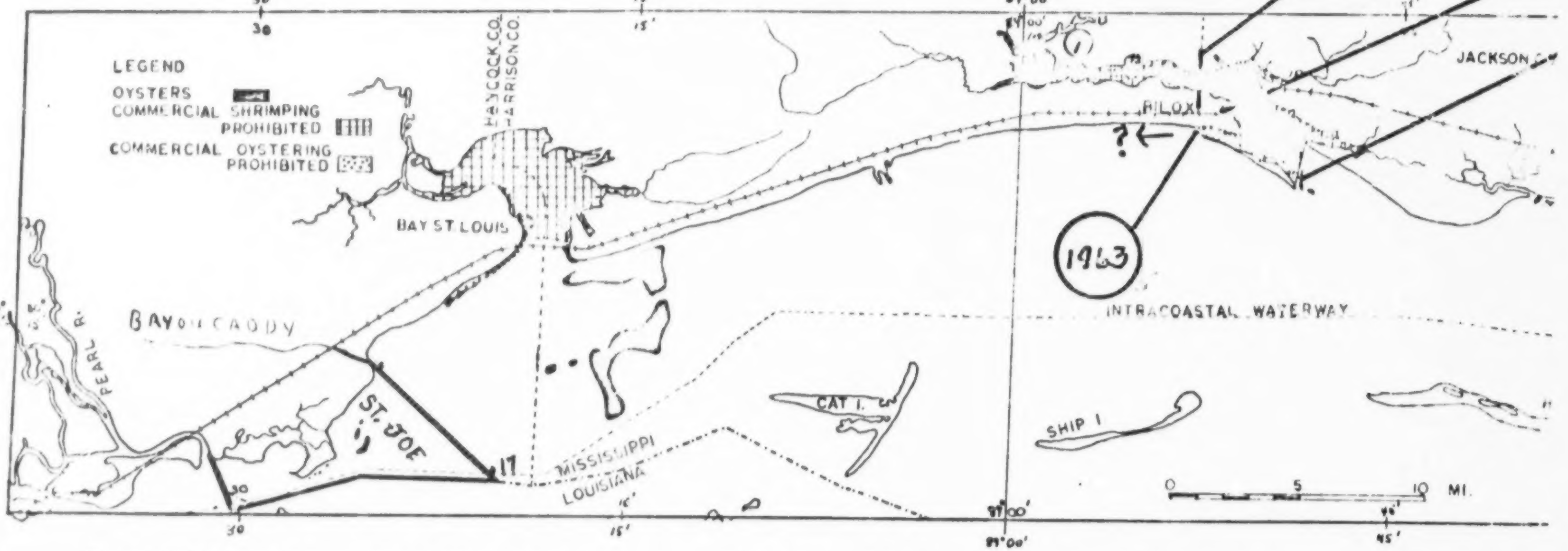
New oyster tonging areas 6 miles east of Pascagoula to be OPENED are: Bangs Lake, Bangs Bayou, Bayou Combest, Crooked Bayou, Jose Bay and Point Aux Chesnes Bay.

It is unlawful to open (shuck) raw oysters except in shops or establishments approved by the State Board of Health.

Another regulation of the State Board of Health that will be strictly enforced is that boats catching, transporting, or handling oysters must contain false bottoms to keep the oysters clear of bilge water.

Oyster Tonging and Handling Regulations

BY ORDER OF THE MISSISSIPPI STATE BOARD OF HEALTH AND
BY ORDINANCES NOS. 7, 9, 24 AND 38 OF THE MISSISSIPPI MARINE CONSERVATION COMMISSION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The areas 700 feet from the seawall north of Bay St. Louis to Grand Bayou, 500 feet, from Mallini Point to Henderson Point, and 200 feet, from the beach, from Henderson Point to Pass Christian Yacht Harbor, are closed to taking or catching oysters, effective from and after Februray 18, 1961, until further notice of this commission.

All of the area that lies within the boundaries formed by a line running from Biloxi Lighthouse southward to Biloxi Channel Marker "10", thence eastward following the meanderings of the north shore of Deer Island to east end of Deer Island, thence northeastward to Marsh Point, including Davis Bay, is closed to taking or catching oysters.

GRAVELINE BAYOU and GRAVELINE BAY will be open until further notice of this commission.

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Bangs Lake, Bangs Bayou
Point Aux Chesnes Bay.

It is unlawful to open
ments approved by the St

Another regulation of
enforced is that boats ca
contain false bottoms to k

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Mississippi State Senate

JACKSON

January 13, 1968

Director, Technical Programs
Southeast Water Laboratory
Federal Water Pollution Control Administration
Athens, Georgia 30601

Dear Sir:

As you were advised on January 4, 1968, I wish the following statement presented at the public meeting to be held on Wednesday, January 17, 1968 at the Broadwater Beach Hotel, in Biloxi, Mississippi.

Inasmuch as my legislative duties will prevent my actual attendance, please read in this statement as a part of the official record.

MR. CHAIRMAN:

I intend to make only a brief statement as an interested individual with regard to this hearing. While the State of Mississippi is blessed with a short coastline, it is blessed with an abundance of natural renewable marine resources in the form of fish, crab, shrimp and oysters which bring in a sales income of Sixteen Million Dollars ($16,000,000.00) annually to the State.

I am deeply concerned with preserving and maintaining the coastal waters of our State in as near to pristine conditions as possible so that the people of our fine sovereign State will continue to enjoy the bountiful harvest from its waters and also enjoy the many forms of recreation that these waters provide.

Mississippi has been and is continuously moving to assume the responsibility of pollution control within its boundaries and cooperating with its neighboring States in order to maintain clean water conditions.

Recently, by an Act of the Mississippi Legislature, an Air and Water Pollution Control Commission was established to handle the various pollution problems within the State. I feel that this body along with the competent scientific personnel in the State can handle any situation which might arise without any federal interference or intervention. At best, pollution problems are difficult enough to handle when you are dealing with factors that are known. A few years ago, the U. S. Public Health Service set up a standard on oysters which is being applied to all oystering areas in the United States. I understand that the organism that is used as an indicator of contamination from human sources is not harmful though not entirely indigenous to the human intestinal tract. I am fearful of the consequences which might result from any other standards imposed which have not been worked out to apply to our warm coastal waters. The aforementioned remark is all the more reason why I think that these problems should be handled on a local level.

Lastly, I would like to say that I am deeply concerned with the rapidity with which the Federal government is projecting itself into situations which can be handled entirely by this State.

Thank you for the opportunity to voice my opinion at this hearing.

Nap L. Cassibry
State Senator
District 35
Harrison County, Mississippi

cc: Mr. John R. Thoman
Regional Director
Federal Water Pollution Control Administration
Atlanta, Georgia

Mr. Robert S. Wright, Executive Secretary
Mississippi Air & Water Pollution Control Commission
416 North State Street
Jackson, Mississippi

MISSISSIPPI STATE UNIVERSITY

DEPARTMENT OF FORESTRY
SCHOOL OF FOREST RESOURCES AND
AGRICULTURAL EXPERIMENT STATION
P. O. DRAWER FD
STATE COLLEGE, MISSISSIPPI 39762
PHONE (601) 323-4321, EXT. 501

January 19, 1968

Mr. John R. Thoman, Regional Director
Technical Programs, Southern Water Laboratory
Federal Water Pollution Control Administration
Athens, Georgia 30601

Dear Mr. Thoman:

I am writing as a representative in Mississippi for The Nature Conservancy. The thoughts, following, should not, however, be construed to represent the thinking of the Conservancy.

At the public meeting on January 17, 1968, I was not prepared to present a statement. Indeed, it seemed unnecessary to do so. The case against the drastic alteration of the ecological systems was well presented. The matter of the aesthetic value of preserving at least part of our estuarine areas in a wholly natural condition received mere mention. It is impossible to meaningfully express the value of a great painting or poem or composition or a clear, clean Mississippi coastal stream bordered by undisturbed vegetation.

Another matter, in a sense related to aesthetics, was not touched on at the meeting. It is what might be called "The-appreciation-of-nature" value or the "museum" value. A wart hog is hardly aesthetically pleasing yet we appreciate or enjoy it as part of our world environment. In the same vein, one might consider coastal marshes as having this very real "wart-hog appreciation" value for many.

Sincerely yours,

Edward G. Roberts
Professor

EGR/11

cc: Thomas W. Richards

MISSISSIPPI STATE UNIVERSITY

DEPARTMENT OF FORESTRY
SCHOOL OF FOREST RESOURCES AND
AGRICULTURAL EXPERIMENT STATION
P. O. DRAWER FD
STATE COLLEGE, MISSISSIPPI 39762
PHONE (601) 323-4321, EXT. 501

January 19, 1968

Mr. John R. Thoman, Regional Director
Technical Programs, Southern Water Laboratory
Federal Water Pollution Control Administration
Athens, Georgia 30601

Dear Mr. Thoman:

As a representative of The Nature Conservancy, I have mailed you a brief statement on the matter of Mississippi estuarine pollution. I should like, herein, to write as a forester, a university professor, and as one concerned with recreation and natural beauty.

I urge a field study, under the aegis of a person or agency concerned with applied ecology, of the estuarine zone of Mississippi. This study would be directed toward the possibilities of such things as zoning, easements, purchase, bequest, and the like. It might be profitable to recall that the Mississippi legislation authorizing the establishment of Soil Conservation Districts gives the Districts zoning power.

Sincerely yours,

Edward G. Rober
Professor

EGR/11

cc: Thomas W. Richards

MISSISSIPPI STATE UNIVERSITY

DEPARTMENT OF CIVIL ENGINEERING
P.O. DRAWER CE
STATE COLLEGE, MISSISSIPPI 39762
PHONE (601) 323-4321, EXT. 216

January 25, 1968

Mr. John R. Thoman
Regional Director
Technical Programs
Southeast Water Laboratory
Federal Water Pollution Control Administration
Athens, Georgia 30601

Dear Mr. Thoman:

In accordance with a request from your committee made at the public meeting on estuarine pollution held at the Broadwater Beach Hotel, Biloxi, Mississippi, on January 17, 1968; I wish to submit the following statement concerning areas in which research effort should be expended.

Statement

The most immediate research need in the estuarine waters along the Mississippi Gulf Coast is the same need as is defined in the Clean Water Restoration Act of 1966 which directed the Department of the Interior to make a comprehensive study of pollution problems in the Nation's estuarine areas. Specifically, a research project or projects should be undertaken in Mississippi to accomplish the following goals.

1. Determine the pollution profile of the Gulf of Mexico off the coast of Mississippi. Pollution should be characterized by determining the extent of pollution radiating into the Gulf from the Pearl River, Bay St. Louis, Biloxi Bay, The Pascagoula River, and the Mississippi River. The influence of the Mississippi River and the Mississippi Sound could be observed by comparing water quality inside and outside of the offshore islands.
2. Determine the pollution concentrations in fish and shellfish. Samples of fish and shellfish should be collected, pollutants measured and pollution levels compared with the pollution profile determine in Part 1.

3. Considerations should also be made concerning economic losses due to closing of oyster harvesting areas and swimming and boating areas and interferences with shipping and other water front industrial and commercial activities.

4. Analytical procedures necessary to accomplish these goals would need to be developed along the following lines. In order to obtain a maximum of information concerning these pollution profiles in as short a time as possible, rapid methods of sampling should be developed for this and for other estuarine pollution studies as well. Temperature, dissolved oxygen, turbidity, and oxidation-reduction potential profiles could be obtained by towing recording instruments behind a boat traversing a fixed course. Results of this survey would indicate where portable automatic samplers should be placed. Automatic sample analyzers would then be required to analyze the great number of samples necessary to adequately define the pollution profile.

After completion of this initial survey, the following procedures should be followed:

1. Pollution Profile

   a. Sample locations would be chosen from results of the preliminary study to characterize discharges from the five major sources listed above.

   b. Chemical samples would be taken with an automatic sampler which can take separate samples on a time sequence of from 5 minutes to 24 hours. Samples would be taken from as many points and as many depths including bottom mud as prove necessary to determine this profile.

   c. Temperature, turbidity, oxidation-reduction potential, and dissolved oxygen measurements would be made and recorded with automatic equipment.

   d. Current velocities and directions would be taken with recording equipment and compared with available data from other sources.

   e. Chemical analyses would be selected in accordance with anticipated pollution components such as sewage, agricultural chemicals, petrochemical wastes, and paper mill wastes. Analyses would include:

(1). Biochemical oxygen demand
(2). Chemical oxygen demand
(3). Total solids
(4). Suspended solids
(5). Turbidity
(6). Alkalinity
(7). Pesticides
(8). Lignin and tannin
(9). Sulfite
(10). Phenols
(11). Phosphate
(12). Coliform organisms
(13). Other quantities as they prove necessary

2. Pollution concentrations in Fish and Shellfish

   a. Fish and shellfish would be collected from selected points in areas of maximum and minimum pollution.

   b. Analyses for pollutant concentrations would be made with special emphasis being given to expected pollutants in a particular area.

3. Effects of Pollution on Economics

   a. Fish and shellfish harvesting information would be obtained from commercial fishing sources.

   b. Comparisons would be made between catches in polluted and non-polluted areas.

   c. Information concerning changes in conditions from past years would also be sought.

Several significant benefits could be realized from such a research project. These would include the following:

1. This project should define principal sources of pollution of waters off the coast of Mississippi. This knowledge would help define where major anti-pollution effort is needed.

2. Fish and shellfish harvests could probably be increased by defining and correcting adverse pollution conditions. Also shellfish should be made more safe by correcting conditions of bacterical contamination.

3. Proper use of knowledge obtained from such a study, would make the Gulf Coast more attractive to new industries and aid the overall economy of the area. South Mississippi is already becoming a maritime industrial area with development of such activities as the banana port at Gulfport, the Industrial Canal, and the gigantic expansion at the Ingalls Shipbuilding Corporation. Other areas of economic importance in this area include large fish, shrimp, and oyster industries, a paper mill, an oil refinery, and increasing recreational development. Careful planning will be necessary to keep from disrupting the aquatic balance with this and future growth.

4. This study would provide a better understanding of the overall picture of the Gulf of Mexico in this area. Also it should aid in planning of similar studies in other areas with the survey and sampling techniques which would be developed.

The Department of Civil Engineering and other departments at Mississippi State University stand ready, willing, and capable of contracting to do such of this research as would be scheduled by the Department of the Interior. Please accept this statement for the record as submitted by:

Yours truly,

Lloyd R Robinson Jr.

Lloyd R. Robinson, Jr., Ph. D., P.E.
Associate Professor
Sanitary Engineering

P.S. Please send me a copy of the proceedings of the hearing. Also place my name on your mailing list to receive future publications concerning problems with estuarine pollution. Thank you.

LRR

Endorsed and approved by:

Billy J. Shell, Ph. D., P. E.
Director
Engineering and Industrial Experiment Station

Mississippi Boat and Water Safety Commission
Phone 355-936 Ext. 223
605 West Capitol Street
JACKSON, MISSISSIPPI 39203

Traina
Silva

January 1[illegible], 1968

84<

Director U. S. Department of Interior
1421 Peachtree Street N. E.
Atlanta Georgia 30309

Dear Mr. Thoman:

As per your request I am giving you some of my views on pollution problems in the estuarine areas in Mississippi. Let me preface my remarks by saying I am not new with the problems of pollution. For the past 27 years I have been active in the Mississippi Wildlife Federation, served one term as a Game and Fish Commissioner and for the past seven and one half years with the Boat and Water Safety Commission.

1. With the rapid population growth and industry expanding along our waterways that empty into the Gulf of Mexico, we are going to have pollution. We need to know some facts about pollution. The sources, how much can we live with, what standards are available. The kind of pollution most injurious to human life and marine life in estuarine areas.

2. A coordinating commission to see that federal, state and local effort are put to the most effective use toward solving the problems.

3. A very comprehensive study should be inaregerated, enlisting the help of state research and developement agencies as well as our colleges and universities who have the equipment and technical know how. When this study is completed, we will have the facts and be able to approch the problems of pollution to an intelligent degree.

In the past the problems have not been approched with an overall picture. A concentrated effort by all agencies, state and local together with interested organizations as well as industry will bring to everyones attention the urgency of conserving the second most vital resource, water.

It would certainly be well to include in your study the report of the pollution study committee of the National Association of State Boating Law Administrators, which is available from Outboard Boating Club, 333 North Michigan Avenue, Chicago, Illnois 60601.

Page 2
MR. Thoman:
January 18, 1968

With the technical data available, this committee has certainly taken a practical approch to pollution as for as pleasure boating is concerned .

The Congress has certainly taken the proper step and at the conclusion of the public hearing the information obtained will enable the proper guide lines to be enacted to properly control water pollution.

Yours very truly,

Ralph Tatum

Ralph Tatum
Director

GULF REGIONAL PLANNING COMMISSION

SERVING PEARL RIVER, HANCOCK, HARRISON AND JACKSON COUNTIES OF MISS.

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86

STATEMENT OF THE COMMISSION
for presentation to
PUBLIC MEETING ON ESTAURINE POLLUTION

January 17, 1968

Broadwater Beach Hotel
Biloxi, Mississippi

GR
PC

1. Identification, Authority, Jurisdiction.

The Gulf Regional Planning Commission has been established pursuant to the provisions of House Bill No. 393, Mississippi Legislature, 1964. Enabling legislation declares that the Commission shall serve in an advisory capacity to the governing authority of participating jurisdictions, preparing and making recommendations upon comprehensive long-range development plans, water supply, sewage collection, treatment and disposition, public recreation, public buildings, acquisition and disposition of public lands, regulations for control of land uses, and certain other appropriate matters.

Presently participating in the programs of the Commission are the Mississippi Counties of Hancock, Harrison, Jackson and Pearl River.

2. Status of Comprehensive Plan Studies.

The Gulf Regional Planning Commission has initiated a series of activities which constitute the essential basis for a long-range comprehensive plan for the region. These include the preparation of current, standardized base maps, population and economic base studies, and an existing land use analysis. An Urban Area Transportation Study is expected to be begun shortly.

Following completion of these basic studies, there will be detailed studies of, for example, Tourism and Recreation Potential, Industrial Development Feasibility Study, and Public Utilities.

The Commission has formally stated its intention to undertake studies of water resources, necessarily including pollution abatement and recommended measures therefor.

3. Estaurine Zones Within the Region.

The planning region contains four readily identifiable estaurine zones:

a. Pascagoula River, with a drainage basin which contains densely developed urban areas, industrial concentrations and extensive marsh areas.

b. Biloxi Bay, surrounded for much of its length by urban development, a planned industrial area and a major steam generating electric power station.

c. Bay of St. Louis, also flanked in part by urban development, only limited areas, of which are adequately served by sanitary sewage collection, treatment and disposition systems.

d. Pearl River, a major stream with a number of urban centers and industrial installations of its middle reaches.

Comprehensive, well-coordinated programs have been initiated on the Pascagoula and Pearl River systems which will provide significant benefits in quality control. Only limited local programs for pollution control have been initiated for Biloxi Bay and the Bay of St. Louis, primarily municipal in scope.

4. Long-range Concerns.

The Gulf Regional Planning Commission is vitally concerned with the degrading effects of continued estaurine pollution. Principal among these are:

a. Commercial Fisheries, including shellfish. Existing levels of pollution are already having a depressing effect upon the industry, necessitating consideration of the relocation of formerly productive oyster beds. Spokesmen for other agencies and interests are in a position to comment upon the economic effects should additional productive areas become contaminated to a point unfit for human consumption.

b. Recreation, including pleasure boating, swimming, hunting, and non-commercial fishing. With respect to the latter, attention is called to the increased popularity of the region as a retirement home area, with an attendant increase in the number of retirees who fish both for pleasure and as a supplemental source of food for family consumption.

c. Esthetically, increasing levels of estaurine pollution create a displeasing situation which, if not corrected, will militate against the natural attractiveness of the area for all of the activities referred to above. Such a situation will ultimately deprive the region of an important asset and significantly increase the potential for full development of tourist and recreation attractions and facilities.

The Commission is not presently in a position to speak with authority on the economic importance and/or impact of the activities mentioned; there are certain to be others in attendance who can do so.

The Commission is, however, concerned with the total development of the region, and is committed to cooperate with appropriate local, State and Federal agencies and private interests in accomplishment of a level of development offering the maximum range of choice while protecting the major public interests of all the inhabitants.

Jack Different
Executive Director

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION HEARING
BROADWATER BEACH HOTEL, BILOXI, MISSISSIPPI
JANUARY 17, 1968

STATEMENT OF JEFF W. NAPIER - OUTBOARD BOATING CLUB OF AMERICA

The purpose of this hearing, to my understanding, is to obtain contributions from interested parties in order to help the Department of the Interior in its management of the nation's estuarine areas. An obvious concern in managing estuarine areas, and our primary concern here today, is pollution control. Other concerns are making optimum use of estuarine areas and determining how this natural resource should be managed generally.

What is the optimum use of an estuarine area? What should be the goal or goals in management of these areas by the Department of the Interior? There are possibly some who would still like to consider estuaries as a handy disposal area for industrial or municipal wastes. Boaters do not share these views.

There are many who feel that a natural resource such as an estuary should be used for the greatest benefit to the greatest number of people - an old democratic concept. This use concept is generally otherwise known as the multi-use concept in recreational circles.

Boaters would largely endorse the multi-use idea for estuarine management as a realistic program to meet the demands for a limited natural resource. We would add one condition, however. The qualification is that we do not feel that the multi-use concept should prevail if such use will destroy the estuary. An estuary is destroyed if some unique and valuable facet of its existence is destroyed. Similarly, we do not think the multi-purpose concept should prevail if it permits one of the uses to so degrade the estuary that the other uses are no longer possible.

The biggest spoiler of unique and valuable estuarine assets is water pollution. The estuarine use most likely to push other users of an estuary out of the picture is the waste disposal or pollution use. Therefore, we boaters favor a multi-use concept for estuarine management - as long as one of the uses is not pollution.

A survey of OBC members on their boating activities was made about a year ago. A nation-wide sampling of about 20% of the membership or about 4,000 persons was taken. The results are informative for our consideration of estuarine management. Forty-three percent of us indicated that we use rivers and coastal waters as our primary boating areas. In many cases, if not most, these areas were estuaries.

Estuarine areas are popular for recreational boating because they offer sheltered waters and a generally good variety of fishing with the close proximity of both salt and fresh water species. Most major estuaries have major cities located nearby which means the estuary is handy for the urban boater. Often they are an enjoyable route to scenic or historical sites. Our concern about estuary management is obvious.

What do boaters use an estuary for? Boating, of course, but that term includes many related activities. Again according to the member survey, ninety-five percent of our members said they spent an average of fifty percent of their boating time just cruising. Sixty-eight percent spent one-third of their time fishing. Sixty-seven percent spent forty percent of their time involved in water skiing. Other boat uses included hunting, swimming, racing and scuba diving. These activities, then, are what should be considered when talking about boating in relationship to estuary management.

What the value of recreational boating is in terms of the health, relaxation and enjoyment of our nation's people is hard to measure like all intangibles. Perhaps an indication can be gained from the fact that there are 8 million recreational craft of all types in use in the U.S. An estimated 40 million people go boating every year. Boat owners are estimated to spend $3 billion on all types of new and used boating equipment, fuel and services every year. And finally, boating has been growing at an annual rate of more than five percent in the last several years. It is safe to say that boating is one of the more popular forms of outdoor recreation and is likely to become more popular.

I could provide many more statistics indicating the value of estuarine areas to recreational boating. For the sake of brevity I will not, but rather trust that the general facts and figures given have indicated the great interest of boaters in estuary management. It naturally follows that we are also greatly concerned with problems of pollution of all waters, including estaurine areas.

Probably boaters have observed first hand more of the damages of pollution and littering of more of this country's waters than any other recognizable group of persons - including FWPCA employees. Few groups have a bigger stake in clean water than boaters. Pollution takes the fish out of our fishing, the health from our water contact sports and the beauty from our shores and beaches. It puts scum on our hulls, the stench of oil, chemicals and garbage in the sea air and substitutes a spectrum of bilious colors for blue water. You don't have to sell boaters on fighting pollution.

We cannot make detailed or technical recommendations on how the massive volume of vile liquids from industrial and municipal sewers can be stopped from entering our boating waters. It is unrealistic to think that all of these pollutants can be stopped tomorrow. Federal grants to municipalities and tax concessions to industry for pollution treatment is one answer over the long haul. Will it be enough before some of our waters are beyond redemption?

Consider, for example, my home area of Chicago on Lake Michigan. Just one steel plant in the huge industrial complex at the south end of Lake Michigan pours 440,000,000 gallons of pollutants into the lake every day according to the Illinois Sanitary Water Board. This amount would fill a receptacle a block square and twenty stories high - every day. Since the south end of the lake is not twenty stories deep, the net result is that several square blocks of water area are thoroughly polluted, surface to bottom, every day from this one plant. I'm sure there are similar examples in the estuaries of this part of the country.

It is almost impossible even to imagine how all the recreational boats in the country could equal the spectacular pollution achievement of this one industrial plant on one body of water. Every one of the 8 million recreational vessels in the country would have to be a veritable floating bathroom all year around to do what this one plant - typical of many industrial and municipal polluters - does in only a day. For example, each of the 8 million motorboats, sailboats, canoes and rowboats, regardless of size, would have to be equipped with a toilet. Each toilet would have to flush 2 gallons of liquid, 3 times an hour, 24 hours a day all year long to equal the 440,000,000 of effluent of this one plant on one body of water. Needless to say, this is not the case.

As a matter of fact, four years ago the National Association of State Boating Law Administrators appointed a Pollution Committee to investigate how shipshape boaters were maintaining our nation's waterways. After an exhaustive nationwide survey, the NASBLA Pollution Committee concluded that pollution from recreational boats was negligible in virtually all waters. A few specific areas of heavy mooring in stagnant water areas were the only exceptions. The Committee further found that less than 10% of the nation's recreational fleet is equipped with marine toilets.

Although pollution from pleasure craft was not found to be a problem, the Committee realized that it could become one in some areas and that the lack of a problem would not necessarily forestall a host of non-uniform legislative "solutions." As a result, the Committee recommended and NASBLA adopted a Model Act on Sewage Disposal and Littering from Vessels as a guide for jurisdictions which felt regulation necessary. The recommended Model Act has since been followed by several key boating states.

The Act prohibits untreated sewage discharges into the waters but allows toilet use with chemical treatment devices meeting certain effluent standards, incineration or holding tanks. Just what a minimum treatment standard should be is now in final stages of a study by the National Sanitation Foundation of Ann Arbor, Michigan. This non-profit testing laboratory is being assisted in this work by state and Federal health officers, the people who have the final say on acceptability of treatment devices in their respective jurisdictions.

Endorsement of the NASBLA Model Act implemented by the Sanitation Foundation's uniform performance standards for watercraft sewage treatment devices has come from many quarters. In addition to endorsement by the Outboard Boating Club of America, the National Boating Federation, a national organization of state boating clubs, is in favor of the approach. So is the National Conference of State Sanitary Engineers.

Granting that regulation of discharges from pleasure craft is inevitable, although not generally warranted at this time, the most ideal solution from the boater's standpoint would be adoption of the NASBLA Model Act by all states - covering both waters of exclusive state jurisdiction and waters of concurrent state-Federal jurisdiction. How can we get all states to do this on a uniform and reciprocal basis?

In the final analysis, Federal legislation setting forth guidelines which the states will be obliged to follow may be necessary in order to secure uniformity. There is precedent for this in the Federal Boating Act of 1958 under which 47 states have complied with Federal standards in exchange for the privilege of numbering pleasure craft on all waters within their territorial limits. In the same manner, NASBLA's model act on waste discharge from boats might be made Federal law. Whether state or Federally administered, boaters would have only one basic law governing them in pollution and littering matters. This answer seems very reasonable, logical, workable and in accord with various Federal water quality control laws which set guidelines but leave primary responsibilities of administration and enforcement to the states. "Creative Federalism," I believe it's called.

Regrettably, this is not the approach being taken by the Federal government. Two study reports of vessel discharges were recently prepared by the Secretary of the Interior through the Federal Water Pollution Control Administration - one for the Congress and one for the President. Boaters feel that both the data presented and the recommendations made by these studies are highly unrealistic.

For example, the studies say that 1.3 million pleasure boats out of the 8 million motorboats, sailboats, canoes and rowboats in the country are equipped with marine toilets. That's one out of every six boats! Yet, a recent survey asking all marine toilet manufacturers how many units they had produced since they were in business indicated total production of all marine toilet manufacturers combined to be only 500,000 to 700,000 units. Even if every unit were still in use, total production over the years has amounted to only half of what the FWPCA report claims are in use.

Clearly the researchers of the report did not consult the National Association of State Boating Law Administrators or the NASBLA Pollution Committee or even knowledgeable boatmen when they came up with further breakdowns on the number and types of recreational craft equipped with marine toilets. The report says that 90 percent of all inboard boats, 80 percent of all outboard boats over 16.5 feet in length and 50 percent of all sailboats without auxiliary power have toilets. For 1966, marine industry sales records show that 81 percent of all sailboats sold without auxiliary power were 15 feet or under and about one third of these the surf-board-with-a-sail type. Yet, according to the report, 50 percent of these sailboats under 15 feet in length have toilets. If this were the case boaters should worry more about indecent exposure than pollution.

In view of the inaccuracy of the FWPCA's impression as to the magnitude of discharges from pleasure craft, we would suggest that closer liaison with boating groups should be developed where none has existed heretofore. As a matter of fact, the National Association of State Boating Law Administrators suggested just that by resolution at their annual meeting in San Francisco last November.

We all want to clean up pollution in our nation's waters and we want estuaries to be unpolluted. Boaters are now and have been for years in the forefront of the fight against pollution. We are and have been supporting legislation which would require us to undertake substantial expenses on our boats to insure that they do not contribute to the pollution of our waters. This legislation, notably the NASBLA Model Act or similar provisions is on the books in several states and will be effective in many others within the next two years.

Yet, on the basis of unsupportable facts, the FWPCA steamrollers ahead ignoring the work that has been done to stop even the minimal discharges contributed by boaters. All boaters throughout the country can't even discharge in a year the equivalent volume produced daily by one industrial plant on one body of water.

In conclusion, I submit, that the FWPCA should more effectively direct its efforts by supporting adoption of the NASBLA Model Act and National Sanitation Foundation standards into Federal law enabling greater devotion to the overwhelming task of cleaning up the major sources of pollution. Only by concentrating on the major sources of pollution will our actions be timely enough and of sufficient magnitude to protect and preserve the waters of our nation's estuaries for all who may wish to use them.

JWN/bhm
1/12/68

STATE OF MICHIGAN

Waterways Commission

GEORGE ROMNEY, Governor

1004 CADILLAC SQUARE BUILDING
DETROIT, MICHIGAN 48226

LEONARD H. THOMSON
Detroit

DR. WALLACE B. WILLMAN
Traverse City

LOUIS H. FREYE
Romeo

CHARLES A. BOYER
Manistee

VOLMAR J. MILLER
Paw Paw

KEITH WILSON, DIRECTOR
TEL. 223-1800

May 25, 1964

Dear Sir:

The National Association of Boating Law Administrators is an organization consisting of State officials concerned with programs involving the registration, regulation, and development of facilities for recreational watercraft.

Because of the considerable concern being expressed throughout the country at this time about the continuing pollution of our waters, it is the desire of this Association to determine the extent of such pollution attributable to recreational boating. After basic determinations of this type have been made, it is the further intent of the Association to make recommendations to the various States of ways to combat pollution from this source.

To assist the Association's Pollution Study Committee, it is requested that you complete the enclosed questionnaire and return it to the Outboard Boating Club of America which is serving as special Staff Assistant to the Committee on this study. If you are unable to complete the questionnaire yourself, it is requested that the form be forwarded to the appropriate State agency having jurisdiction over this matter.

Your cooperation in this important study will be most sincerely appreciated.

Very truly yours,

Keith Wilson
Chairman, Pollution Study Committee,
National Association of Boating
Law Administrators

APPENDIX B

FINDINGS OF WATER POLLUTION QUESTIONNAIRE SURVEY

FINDINGS OF WATER POLLUTION QUESTIONNAIRE SURVEY

Scale of Degree of Pollution

1.0 - 1.5	Major
1.6 - 2.5	Moderate
2.6 - 3.5	Minimal
3.6 - 4.0	No problem

KIND OF WATER	SEWAGE	GARBAGE	TRASH	WASTE	AVERAGE VALUE OF ANSWER
COASTAL/OCEAN (30 responding)	3.0	3.3	3.1	3.3	3.2
GREAT LAKES* (7 responding)	2.9	2.9	2.7	3.1	2.9
INLAND LAKES					
Under 500 acres (50 responding)	3.2	3.2	2.8	3.1	3.1
500 acres or over (45 responding)	3.1	3.0	2.7	3.1	3.0
RIVERS AND STREAMS (54 responding)	3.1	3.2	3.0	3.1	3.1
RESERVOIRS (43 responding)	3.2	3.1	2.9	3.3	3.1
AVERAGE VALUE OF ANSWER	3.1	3.2	2.9	3.2	

A. How is the problem of pollution from recreational watercraft being handled in your state or area? (52 responding)

Regulation 42.3% Education 21.2% Both 36.5%

B. Are boating groups and individuals self-policing in efforts they make to keep the water and shoreside areas clean for their own sake? (58 responding)

Yes 39.6% No 46.6% Boating groups and clubs are but not individuals 13.8%

C. Do you think marinas are contributing to water pollution, etc.? (61 responding)

Yes 62.3%	No 37.7%

* The figures for the Great Lakes may be misleading inasmuch as the total number of responses concerning this type of water was only seven. Therefore, a single extreme response will affect the final average answer more than a single such response would in any of the other KIND OF WATER categories.

Of 91 State and Federal agencies who answered the questionnaire only 8 cited pollution from recreational watercraft as a major contributor to the over-all water pollution problem by circling #1 on the questionnaire form. They and the kind of pollution they stressed are as follows:

1. Division of Water Safety
   Alabama Conservation Department -- Sewage and waste on rivers and streams

2. Chief Sanitary Engineer
   Arkansas State Board of Health -- Trash on lakes under 500 acres; trash and waste on lakes 500 acres or over; trash and waste on rivers and streams; garbage, trash and waste on reservoirs

3. Georgia Department of Public Health -- Garbage and trash on lakes under 500 acres

4. Michigan Department of Health -- Trash on Great Lakes

5. Sanitary Engineering Division
   North Carolina State Board of Health -- Sewage on coastal or ocean waters, lakes under 500 acres, lakes over 500 acres, rivers and streams, and reservoirs

6. Municipal Waste Section
   Division of Water Resources
   West Virginia Department of Natural Resources -- Sewage and waste on rivers and streams

7. Region 6, U. S. Forest Service
   (Oregon and Washington) -- Trash on lakes under 500 acres

8. Boat License Division
   Illinois Department of Conservation -- Sewage and waste on rivers and streams

AGENCIES RESPONDING TO QUESTIONNAIRE

Division of Water Safety
Alabama Conservation Department

Division of Public Health
Alaska Department of Health & Welfare

Boat Registration Branch
Arizona Motor Vehicle Division

Chief Sanitary Engineer
Arkansas State Board of Health

Water Quality Control Board
California Resources Agency

California Division of Small Craft Harbors

Bureau of Sanitary Engineering
California Department of Public Health

Water Pollution Control Engineer
Colorado Department of Public Health

Chief Boat Warden
Colorado Game, Fish & Parks Department

Sanitary Engineering Division
Connecticut State Department of Health

Boating Safety Commission
Connecticut Dept. of Agric. & Natural Resources

Small Boat Safety Division
Delaware Commission of Shell Fisheries

Harbor Precinct
Washington, D. C. Metropolitan Police Department

Engineer
Florida Board of Conservation

Florida Boating Council

Division of Water Resources
Florida Board of Conservation

Bureau of Sanitary Engineering
Florida State Board of Health

Georgia Department of Public Health

Georgia Game & Fish Commission

Environmental Health Engineering
Hawaii Department of Health

Harbors Division
Hawaii Department of Transportation

Idaho Motor Vehicle Bureau

Public Health Biologist
Engineering and Sanitation Division
Idaho Department of Health

Boat Licensing Division
Illinois Department of Conservation

Superintendent of Waters
Iowa Conservation Commission

Kansas Forestry, Fish & Game Commission

Kentucky Water Pollution Control Commission

Division of Boating
Kentucky Department of Public Safety

Maine Water Improvement Commission

District Engineer
Maryland Department of Water Resources

Boating Division
Maryland Department of Chesapeake Bay Affairs

Sanitary Biologist
Massachusetts Department of Public Health

Massachusetts Division of Motorboats

Michigan State Waterways Commission

Michigan Department of Health

Section of Water Pollution Control
Minnesota Department of Health

State Boating Safety Committee
Mississippi Game and Fish Commission

Water Pollution Board
Missouri Department of Public Health & Welfare

Sanitary Engineer Director
Water Supply and Pollution Control
Missouri Department of Health, Education & Welfare

Montana Pollution Control Section, Aquatic Biology
Montana State Board of Health

Montana State Board of Health

Boating Division
Nebraska Game, Forestation & Parks Commission

Environmental Health Services
Nebraska Department of Health

Motorboat Section
Nevada Department of Motor Vehicles

Nevada State Health Department

New Hampshire Water Pollution Commission

New Jersey Marine Patrol

New Mexico Department of Public Health

New Mexico Park & Recreation Commission

Division of Environmental Health Services
New York Department of Health

Division of Motorboats
New York Conservation Department

Division of Stream Sanitation
North Carolina Department of Water Resources

Sanitary Engineering Division
North Carolina State Board of Health

North Carolina Wildlife Resources Commission

Division of Water Supply & Pollution Control
North Dakota State Department of Health

North Dakota Game & Fish Department

Ohio Division of Watercraft

Oklahoma Planning & Resources Board

Oregon State Marine Board

State Sanitary Authority
Oregon State Board of Health

Division of Sanitary Engineering
Pennsylvania Department of Health

Division of Harbors & Rivers, Rhode Island

Rhode Island Department of Health

Division of Boating
South Carolina Wildlife Resources Department

Division of Law Enforcement
South Dakota Game, Fish & Parks Department

Tennessee Game and Fish Commission

Texas Department of Health

Motor Vehicle Division
Texas Highway Department

Utah Boating Division

Virginia Commission of Game & Inland Fisheries

Sanitary Engineering Section
Washington State Department of Health

Washington Pollution Control Commission

West Virginia Department of Health

Municipal Waste Section
Division of Water Resources
West Virginia Department of Natural Resources

Port Advisor
Wisconsin Department of Resource Development

Sanitary Engineering
Wisconsin State Board of Health

Wisconsin Department of Conservation

Wyoming Game & Fish Commission

Wyoming Department of Public Health

U. S. COAST GUARD

Third District (New Jersey, Connecticut, Vermont, portions of New York, Pennsylvania, Delaware)

Eighth District (Louisiana, Texas, New Mexico, portions of Alabama, Arkansas, Mississippi, Georgia and Florida)

Thirteenth District (Washington, Oregon, Idaho, and Montana)

U. S. BUREAU OF RECLAMATION

Region 2 (California)

Region 4 (Colorado, Wyoming, New Mexico, Arizona)

Region 5 (Oklahoma, Texas, Colorado, Kansas, New Mexico)

U. S. FOREST SERVICE

Region 5 (California)

Region 6 (Oregon and Washington)

Bureau of Sport Fisheries and Wildlife
Regional Office, Oregon

Headquarters
Bureau of Outdoor Recreation

National Park Service
National Capital Region

Tennessee Valley Authority

ANALYSIS OF RESPONSES TO QUESTIONS 11 AND 15 OF WATER POLLUTION QUESTIONNAIRE SUBMITTED BY WATER POLLUTION STUDY COMMITTEE, NATIONAL ASSOCIATION OF BOATING LAW ADMINISTRATORS

It would appear from the questionnaire that the pollution problem created by recreational watercraft is considered to be, in most waters, negligible. A few quotes from the questionnaire will suffice in this regard:

> "In my opinion, pollution from recreational craft is infinitesimal."
>
> "Make cities and communities put in proper disposal plants. Get at the source -- clean up the big polluters like cities, towns, industry and shore cottages."
>
> "Most of the trash in our freshwater streams is left by people fishing on the banks."

Answers to the questionnaire indicated that, of the small part of the pollution problem created by recreational watercraft, trash thrown overboard by individuals was of the greatest concern. Most individuals believed that members of boating organizations, clubs, etc., are fairly well self-policing. The majority of those replying suggested education through literature, posters, and clubs as the best and ultimate solution to stopping whatever pollution is being contributed by recreational watercraft users -- "the water they pollute is their own" idea. An example of a successful education program against water pollution is that conducted by the Ohio River Valley Water Sanitation Commission, which has done a big job in the last few years through educational programs.

It was the consensus of those replying that the marine toilet is not a noticeable contributor to water pollution where it exists, with the exception of a few areas of heavy boating concentration, notably marinas. Those replying said that marinas could and should solve their problems by providing adequate shore facilities and regulating marine toilet use by those docked at the marina. Rough figures indicate that on a nationwide average, less than 10% of all recreational watercraft have marine toilets. Necessarily, these are larger craft which are found more often on coastal and Great Lakes waters than on small land-locked lakes.

With the expected increase in recreational boating, there was some concern expressed about marine toilets becoming a pollution problem in the future. Most thoughts expressed in this area were that if the problem does arise, it could best be handled by installation of various treatment devices on marine toilets, including chlorination, incineration, and holding tank systems. Where there are regulations, the trend is noticeably away from toilet sealing restrictions and toward treatment systems. The sealing restrictions, operating against nature, decidedly discourage recreational boating and also create administrative headaches.

Virtually all who made suggestions of any nature, stressed the idea of uniformity among the states in implementing regulations to control this matter. Without uniformity, it was felt that new regulations would be unreasonably burdensome on interstate boaters as well as difficult to enforce.

APPENDIX C

A MODEL ACT TO PROHIBIT LITTERING AND THE DISPOSAL OF UNTREATED SEWAGE FROM BOATS

A MODEL ACT TO PROHIBIT LITTERING AND THE DISPOSAL OF UNTREATED SEWAGE FROM BOATS

TITLE

An Act to regulate the disposal of sewage from watercraft and to prohibit littering of waterways

1. DEFINITIONS

For purposes of this Act, unless the context clearly requires a different meaning:

(a) The term "watercraft" means any contrivance used or capable of being used for navigation upon water whether or not capable of self-propulsion, except passenger or cargo-carrying vessels subject to the Interstate Quarantine Regulations of the United States Public Health Service adopted pursuant to Title 42 United States Codes 241 and 243.

(b) The term "sewage" means all human body wastes.

(c) The term "litter" means any bottles, glass, crockery, cans, scrap metal, junk, paper, garbage, rubbish, or similar refuse discarded as no longer useful or useable.

(d) The term "marine toilet" means any toilet on or within any watercraft to discharge waste.

(e) The term "waters of this State" means all of the waterways on which watercraft shall be used or operated.

> Note: In some states it may be desired to limit the application of this Act to certain waters only and thereby exempt large bodies of water or water areas that are remote from population centers and on which there is no congestion and no conceivable boat pollution problem. The waters subject to pollution control under this Act could be enumerated or the state agency which is designated to administer the Act could be authorized to make a finding that a particular waterway should or should not be affected.

(f) The term "person" means an individual, partnership, firm, corporation, association, or other entity.

(g) The term "Department" means the (name of the State agency which shall administer this Act).

> The choice of agency lies within the discretion of each state. It is recommended, however, that consideration be given to the state agency dealing with boating matters in general.

2. LITTERING OR POLLUTING WATER - RESTRICTIONS

(a) No person shall place, throw, deposit, or discharge, or cause to be placed, thrown, deposited, or discharged into the waters of this State, any litter, sewage, or other liquid or solid materials which render the water unsightly, noxious or otherwise unwholesome so as to be detrimental to the public health or welfare or to the enjoyment of the water for recreational purposes.

(b) It shall be unlawful to discharge, dump, deposit or throw garbage into the waters of this State from a watercraft engaged in commerce.

> This section is deemed sufficiently broad and flexible to prohibit any act committed on shore, in the water, or from aboard any description of watercraft, which litters or tends to pollute the water.

3. MARINE TOILETS - RESTRICTIONS

(a) No marine toilet on any watercraft used or operated upon waters of this State shall be operated so as to discharge any untreated sewage into said waters directly or indirectly.

(b) No person owning or operating a watercraft with a marine toilet shall use, or permit the use of, such toilet on the waters of this State, unless the toilet is equipped with facilities that will adequately treat, hold, incinerate or otherwise handle sewage in a manner that is capable of preventing water pollution.

(c) No container of sewage shall be placed, left, discharged or caused to be placed, left or discharged in or near any waters of this State by any person at any time.

This section prohibits the discharge of any untreated sewage from marine toilets.

4. MARINE TOILETS - POLLUTION CONTROL DEVICES

(a) After the effective date of this Act every marine toilet on watercraft used or operated upon the waters of this State shall be equipped with a suitable pollution control device in operating condition.

(b) Pollution control devices that are acceptable for purposes of this Act are:

1. Facilities that macerate or grind sewage solids and which, by chlorination or other means, disinfect the remnants before discharge into the water.

2. Holding tanks which retain toilet wastes for disposal at dockside or on-shore pumping facilities or in deep waters away from shore.

3. Incinerating type devices which reduce toilet wastes to ash.

4. Any other device that is tested by a recognized testing laboratory and determined to be effective in arresting the possibility of pollution from sewage passing into or through marine toilets.

This section recognizes that there are a variety of devices on the market designed to eliminate the possibility of water pollution from sewage passing into or through toilets aboard watercraft. Many of these devices have been tested by various state public health and water pollution control agencies and independent laboratories and found to be efficient for their purpose. However, with further improvements and innovations likely in this product area in the future, it is unwise to "freeze" specifications for such devices in statutory language. All technological changes can be readily incorporated into rules and regulations.

The desirability of nationwide uniformity in requirements for marine toilet pollution control devices cannot be emphasized too strongly. Boatmen will have to incur additional expense to install and maintain such devices. It would be a hardship and an inconvenience for boatmen traveling from state to state to be subjected to different jurisdictional standards of acceptability of these devices.

5. MARINE TOILETS - CHEMICAL TREATMENT FACILITIES - STANDARDS

(a) Every chlorinator or chemical treatment facility shall be securely affixed to the interior discharge opening of a marine toilet, and all sewage passing into or through such toilet shall pass solely through such treatment facility.

(b) Sewage passing through a marine toilet equipped with a chlorinator or chemical treatment facility shall be deemed untreated unless the effluent meets the following minimum standards:

1. Sufficiently divided into fine particles so as to be free of unsightly solids.

2. Containing 1,000 or less coliform per 100 ml.

This standard meets the requirements of the U. S. Public Health Service and is acceptable by most state public health agencies for swimming and bathing purposes.

(c) The chlorinator or chemical treatment facility shall be of a type which functions automatically with the operation of the marine toilet, does not depend on septic action as part of its treatment, is easy to clean and maintain, and does not permit the escape of dangerous gases or obnoxious odors.

(d) The disinfecting agent used in the facility shall be of a kind that does not necessitate too frequent replenishment, is easily obtainable, and when discharged as a part of the effluent is not toxic to humans, fish or wildlife.

The foregoing standards are generally acceptable under existing state marine chlorinator laws. In the interest of uniformity they are recommended to other states proposing the adoption of such laws.

6. MARINE TOILETS - STANDARDS FOR MANUFACTURERS OF POLLUTION CONTROL DEVICES

Every manufacturer of a marine toilet pollution control device described in this Act shall certify to the Department in writing that his product meets the standards set forth in this Act or in any implementing regulations adopted by the Department. Every such certified statement shall be accompanied by a test report showing that the product meets the prescribed standards. It shall be unlawful to sell or to offer for sale in this State any marine toilet pollution control device that has not been so certified and approved by the Department.

7. CERTIFICATE OF NUMBER

The Department may require persons making application for a certificate of number for a watercraft pursuant to (statutory citation of State Boat Numbering Act to be entered here) to disclose whether such watercraft has within or on it a marine toilet, and if so, to certify that such toilet is equipped with a suitable pollution control device as required by this Act. The Department is further empowered to direct that the issuance of a certificate of number or a renewal thereof be withheld if such device has not been installed as required by this Act.

8. ON-SHORE TRASH RECEPTACLES

The owner or whoever is lawfully vested with the possession, management and control of a marina or other waterside facility used by watercraft for launching, docking, mooring and related purposes shall be required to have trash receptacles or similar devices designed for the depositing of trash and refuse at locations where they can be conveniently used by watercraft occupants.

9. EDUCATION

The Department is hereby authorized to undertake and to enlist the support and cooperation of all agencies, political subdivisions, and organizations in the conduct of a public educational program designed to inform the public of the undesirability of depositing trash, litter, and other materials in the waters of this State and of the penalties provided by this Act for such action, and use funds provided by the Legislature for this purpose. The Department is further authorized to utilize all means of communication in the conduct of this program.

10. ENFORCEMENT

All watercraft located upon waters of this State shall be subject to inspection by the Department or any lawfully designated agent or inspector thereof for the purpose of determining whether such watercraft is equipped in compliance herewith. The Department is further authorized to inspect marinas or other waterside public facilities used by watercraft for launching, docking or mooring purposes to determine whether they are equipped with trash receptacles and/or sewage disposal equipment.

11. LOCAL REGULATIONS PROHIBITED

Through the passage of this Act, the State fully reserves to itself the exclusive right to establish requirements with reference to the disposal of sewage from watercraft. In order to ensure state-wide uniformity, the regulation by any political subdivision of the State of sewage disposal from watercraft is prohibited.

12. RULES AND REGULATIONS

The Director of the Department is hereby authorized and empowered to make, adopt, promulgate, amend and repeal all rules and regulations necessary, or convenient for the carrying out of duties and obligations and powers conferred on the Department by this Act.

13. FILING OF REGULATIONS

A copy of the regulations adopted pursuant to this Act and any of the amendments thereto, shall be filed in the office of the Department and in the office of the (official State record keeping agency). Rules and regulations shall be published by the Department in a convenient form.

14. PENALTIES

(a) Every manufacturer of a marine toilet pollution control device who violates Section 6 of this Act or any regulations adopted by the Department pursuant thereto shall be deemed guilty of a misdemeanor and upon conviction shall be punished with a fine of not more than $______.

(b) Any person who violates any other provision of this Act or regulations of the Department adopted pursuant thereto shall be deemed guilty of a misdemeanor and upon conviction shall be punished with a fine of not more than $______, or by imprisonment of not more than ______ days, or by both such fine and imprisonment at the discretion of the court.

15. SAVINGS CLAUSE

If any court shall find any section or sections of this Act to be unconstitutional or otherwise invalid, such findings shall not affect the validity of any sections of this Act which can be given effect.

16. EFFECTIVE DATE

The provisions of this Act with reference to requiring watercraft with toilet facilities to be equipped with pollution control devices shall take effect three years from the date of the adoption of this Act. The provisions of this Act prohibiting littering the waterways shall take effect immediately.

It is suggested that the effective date of this Act be delayed so that all persons affected by its provisions will have a reasonable amount of time to become acquainted with it and secure the required treatment devices.

NATIONAL ASSOCIATION OF STATE BOATING LAW ADMINISTRATORS

POLLUTION STUDY COMMITTEE REPORT

INTRODUCTION

From the very inception of the National Association of State Boating Law Administrators, our organization has been concerned with the pollution of our Nation's waters. We have continually tried to place this matter in its proper perspective and to deal with it realistically and without a great deal of fanfare. Possibly this attempt to work quietly is responsible for some of our problems today. This possibility should be seriously considered by this organization.

Your Pollution Study Committee is attempting to establish both NASBLA and this committee as a recognized authority on the subject of water pollution from pleasure craft. It is the feeling of our committee that any group or organization genuinely concerned about such pollution would wish to consult with the highest authority on the subject, and that NASBLA is the logical organization to which they should turn.

The following report deals with activity in the pollution field during the past year, as well as recommendations for improving our effectiveness to deal with this matter.

During the past year, much has been written and even more said, but relatively little done about actually cleaning up our waterways. About all that has been accomplished has been the generation of a great deal of emotional steam that evaporates into very few hard facts. Of all the laws and regulations affecting boating that have been proposed during this time, the subject of pollution from boats was number one by a wide margin. Ironically, most of the legislation and regulation was not proposed by state boating administrators nor even by persons knowledgeable about boating. And, if this is not bad enough, no one yet has bothered to enter that great unknown of pollution, scientific facts. Despite years of intense discussion, no scientific study, on a national basis, has ever been made to determine whether or to what extent, if any, pleasure boats in fact cause or contribute to conditions of water pollution. This fact is even more regrettable in the light of a recently released Federal report entitled "Wastes From Watercraft" which is discussed in this report.

STATUS OF LEGISLATION

Let's look first at the status of legislation. The last year has seen the states inching toward uniformity in the boat pollution area. Utah adopted the NASBLA Model Act on Sewage Disposal and Littering from Watercraft. The NASBLA Act was also introduced in Michigan; however, the legislature felt no need for pollution legislation. To date ten states have adopted the NASBLA Act or have laws practically identical. These are: Arkansas, Georgia, Hawaii, Minnesota, Missouri, Nevada, New York, North Carolina, Tennessee and Utah.

Other states which passed boat pollution laws other than the NASBLA Act in the last year are:

> Illinois - which prohibits toilets with treatment devices on State-Federal reservoirs and permits only holding tanks on these waters.
>
> Maryland - where it is now unlawful to dump or deposit any type of refuse into public waters.
>
> New Hampshire - which permits flushing of boat toilets equipped with treatment devices only 500 feet beyond shore until January 1, 1969 after which only holding tanks will be acceptable on state waters.
>
> Massachusetts - which prohibits disposal of garbage or refuse in or near inland or coastal waters.

Ohio - which forbids disposal of garbage or other wastes in or along any watercourse.

Washington - where it is now a misdemeanor to discard garbage or refuse into any waters of the state.

Most of the new laws are reasonable and boaters can live with them. Some of this years legislation and proposed legislation, however, was not desirable. California managed to sidetrack some undesirable legislation while Minnesota and Wisconsin are still having problems along their common waterways.

FEDERAL POLLUTION REPORT

In November of last year Congress passed the "Clean Water Restoration Act of 1966" which called on the Secretary of the Interior, the Secretary of the Army, the Secretary of Transportation, the Secretary of the Department of Health, Education, and Welfare and the Secretary of Commerce to conduct a full and complete investigation and study the extent of pollution of all navigable waters of the United States from litter and sewage discharges, dumped, or otherwise deposited into such waters from watercraft using them, and methods of abating either in whole or in part such pollution.

This report was released on August 7, 1967, and is now available. The report bears a rather lengthy and very impressive bibliography, and personal communications referred to includes members of this organization; however, to those of us who had hoped for a document based on scientific study and containing practical solutions to the problems, it is a great disappointment. The report begins by making the following statement: "This report to the Congress will show that the threat to our navigable waters through pollution from vessels of all descriptions is formidable." Does the use of the word "formidable" suggest to you that someone was leaning toward sensationalism? Webster's dictionary says the word formidable means: "Exciting fear; having qualities that discourage approach or attack; tending to inspire awe or wonder." And yet despite the use of this awe-inspiring language there exists within this report, not one iota of factual evidence to indicate that pollution from pleasure craft is anything more than minimal. Despite the lack of scientific study and despite the fact that a very distinguished group of men were consulted during the preparation of the Federal report, it goes even further into the unknown when it makes the statement, "watercraft, particularly recreational boats, have increased to such numbers that their once negligible wastes are becoming a significant factor in the overall pollution picture." Again we say, "where are the facts?" "What indicates that recreational boats have become a significant factor in the overall pollution picture?" In 1966 the Connecticut Boating Commission financed a Health Department study of boating pollution. One short paragraph of the report of the Council stands out as one of the most sensible ever found in a pollution report. The report says: "the Council cannot, in good conscience, recommend any legislation at this time. A great deal more scientific information is needed before it would be possible to reach a conclusion on just the basic question of control or no control."

It is the opinion of your committee that the figures on marine toilet equipped pleasure boats is highly exaggerated. According to the report there are an estimated eight million recreational boats using the navigable waters of the United States today. The report states, without qualification, that there are one million three hundred thousand recreational boats equipped with marine toilets. If you find these figures hard to believe, so does the boating industry. For 1966, industry records show that 81 percent of all sailboats sold were 14 feet and under and unpowered. Yet, according to the FWPCA report, 50 percent of these sailboats under 14 feet have toilets. Forget about pollution, arrest boaters for indecent exposure!

OBC couldn't believe that there were 1.3 million marine toilets in use among the 8 million pleasere boats in the country so they took a survey of marine toilet manufacturers. All companies combined since they have been in business making marine toilets (in one case going back to 1936) produced between 500,000 and 700,000 units. Even presuming that each toilet was still in use, this doesn't begin to approach the 1.3 million heads the FWPCA report says are in use aboard pleasure craft. Average estimates by marine toilet manufacturers were that 80 percent of all inboards have toilets, 50 percent of all outboard boats over 16-1/2 feet have toilets and 6 percent of all sailboats without auxiliary power are so equipped.

There is a brighter side to the Federal report. Some sensible statements and recommendations are included. As an example, the report points out that the job of cleaning up pollution from our cities, towns and factories must move forward also. It says: "Indeed, logic alone demands that both efforts proceed in tandem". This is exactly what we in NASBLA have been saying for years. The report also points out that standards regulating the discharge of sewage should be established after careful consideration of various factors such as economic costs, types of craft and craft operation patterns. The report goes further and proposes an evaluation program to examine the effectiveness of a variety of general methods of abatement and determine which methods are appropriate for various classes of watercraft. This again is something NASBLA has been advocating for some time.

Perhaps some good will come from the Federal report. If those people involved actually want to provide cleaner water in our nation, the National Association of State Boating Law Administrators are the first to offer our assistance. We do, however, resent the implications, from various sources, that recreational boating is a major contributer to water pollution. The recreational boater is the man who must live with the pollution and they can be counted on to wage all out war if they can be convinced that this is not such a limited action. It makes little sense to expect recreational boaters to clean up their own wastes only to have the water remain polluted by cities and industries.

Before an effective program of total pollution abatement from recreational boats can be initiated, many details must be worked out. We propose that:

(a) Federal agencies concerned with pollution control should work more closely with the states and NASBLA;

(b) Any Federal legislation on the subject should be in the nature of guidelines only, to be implemented by the states much as the Bonner Act and the Federal Water Quality Control Act provides;

(c) Any Federal legislation be patterned after the NASBLA Model Act on Sewage Disposal and Littering from Vessels to insure maximum uniformity between state and Federal requirements;

(d) Wherever possible state regulations should be uniform on all waters controlled by the state.

We are concerned that the Federal studies and legislation have not involved desirable coordination or cooperation with the states or NASBLA. We are concerned that unfamiliarity with boating and no attempt to confer with those who do know something will lead to unworkable regulations on the part of the Federal Water Pollution Control Administration. It is the feeling of your Committee that NASBLA's voice should be heard in these matters, particularly at the Federal level of government. We are therefore submitting, through our Resolutions Committee, a resolution dealing with this.

The recreational boaters of our nation stand to gain a great deal from a conscientious, all-inclusive program of pollution abatement. We agree that it will be impossible, in good conscience, to recommend any additional legislation until much more scientific information is available.

NASBLA POLLUTION COMMITTEE RESOLUTION

WHEREAS, the National Association of State Boating Law Administrators has for several years been concerned with putting sewage discharge and littering from pleasure craft into proper perspective in the overall problem of water pollution; and

WHEREAS, this concern was manifested in the appointment of a Pollution Committee which thoroughly studied pollution from pleasure craft throughout the country, and found the problem to be infinitesimal compared to other pollution sources; and

WHEREAS, findings of a recent study of pollution from vessels conducted by the Federal Water Pollution Control Administration are not in consonance with the findings of the NASBLA Pollution Study Committee and appear inaccurate in several important particulars; and

WHEREAS, the Federal Water Pollution Control Administration did not consult with NASBLA to arrive at a fairly objective appraisal of pollution from pleasure craft and practical ways of remedying it; and

WHEREAS, Senate Bill 2525 to control pollution from vessels on navigable waters has been introduced in the Congress by Senator Muskie of Maine as a result of the Federal Water Pollution Control Administration's report; and

WHEREAS, state boating law administrators are deeply concerned that Federal legislation materializing from the findings and recommendations of the Federal Water Pollution Control Administration will produce different pollution control standards for pleasure craft than those followed by many states and cause a serious set back to the uniformity in vessel pollution control laws which NASBLA has strived to achieve;

NOW, THEREFORE, BE IT RESOLVED, that the following recommendations of NASBLA's Pollution Committee be sent to Secretary of the Interior Udall, the Federal Water Pollution Control Administration and Senator Muskie by copy of this resolution:

1) That interested Federal agencies should consult and collaborate with state boating law administrators individually and through the National Association of State Boating Law Administrators in establishing pollution controls for pleasure craft;

2) That if there is to be Federal legislation governing sewage discharge and littering from pleasure craft, such legislation should so far as is practical and consistent with Federal water quality criteria be in harmony with NASBLA's Model Act on Sewage Disposal and Littering from Vessels;

3) That Federal vessel pollution control legislation should also recognize the uniform performance standards and testing procedures for vessel waste treatment devices developed by the National Sanitation Foundation or ABYC or NFPA where applicable;

4) That Federal legislation pertaining to sewage discharge from pleasure craft should not preempt the field but rather should be in the nature of guidelines to be followed by the states in the same manner as Federally approved state boat numbering systems and state water quality criteria were established; and

5) That Federal legislation should be drafted to insure maximum uniformity and reciprocity between the states and between the states and Federal Government.

April 21, 1967

Executive Secretary
Mississippi Air & Water Pollution
 Control Commission
P. O. Box 827
Jackson, Mississippi 39205

Attention: Mr. Barton Ritchie

Gentlemen:

Enclosed herewith is our Statement for the Hearing Record conducted April 6, 1967, Vicksburg, Mississippi, on the Mississippi River.

Yours very truly,

D. C. Lutken
Chief Engineer

DCL/bb

Enclosure

bc: Messrs. R. B. Wilson
D. J. Gray
Alex Rogers
R. W. Braswell
Bethel Ferguson
Jimmy Child
A. C. Rickborn/S. E. Burgust

MISSISSIPPI AIR AND WATER POLLUTION CONTROL COMMISSION

Statement for the record filed after
Mississippi Air and Water Pollution
Control Commission public hearing of
April 6, 1967, Vicksburg, Mississippi
Mississippi River

STATEMENT OF MISSISSIPPI POWER & LIGHT COMPANY

Mississippi Power & Light Company, with response to the notice of the above hearing, respectfully submits the following comments on Proposed Water Quality Criteria for Interstate and Coastal Waters.

Mississippi Power & Light Company, hereinafter called the Company, is a public utility engaged in the generation, transmission and distribution of electric power to the public in the western half of Mississippi. It owns and operates four steam electric generating stations located as follows:

Rex Brown Steam Electric Station, Jackson
Natchez Steam Electric Station, Natchez
Delta Steam Electric Station, Cleveland
Baxter Wilson Steam Electric Station, Vicksburg

Of the above mentioned stations, three; namely, Jackson, Natchez and Cleveland, are not located on interstate streams. The Vicksburg station, however, is located on the Mississippi River and draws cooling water from it and discharges same further downstream. This water is unchanged in quality and quantity except for a slight change in temperature. This is a non-consumptive use.

The subject of water temperature is most important to our operation since the thermodynamics of surface condensers associated with the generating equipment demands that circulating water temperature be as low as possible for efficient operation of our units.

The Company respectfully suggests that the proposed criteria with respect to the classification of Public Water Supply, Fish and Wild Life, and Agricultural and Industrial Water Supply, insofar as temperature is concerned, for each of the above classifications be revised to read as follows:

Temperature: Shall not be increased more than 10° F above the intake natural prevailing background temperature after reasonable mixing of discharged water with surrounding waters.

The Company's reason for this suggestion is quite obvious when it is taken into consideration that often the available water at a power plant intake can be as high as 95° F in the summer months when stream flows are at the lowest and our generating stations are filling the highest electric energy demands of our customers. To impose an inflexible maximum temperature would severely impair the efficiency of our generating facilities, increase the cost of future installations by untold millions of dollars and would certainly increase the cost of electricity to our customers.

The Company respectfully asks the Commission to review the report of the Electric Utilities of Texas Committee on Water Quality. This committee, composed of 17 electric utilities in Texas, was formed to gather information and to study the proposed criteria on thermal pollution by the Texas Water Pollution Control Board. We attach the complete report. With your indulgence, we call your attention to Section II and IV of this report and the following paragraphs:

"In general, concern with water temperature is related to its effects upon fish and other aquatic life. It has become apparent that there are serious deficiencies in our knowledge of these effects in the South. This is a matter of concern to the committee because of the tendency, in the absence of quantitative data, to seek to use temperature limitations developed for Northern waters in spite of the fact that these limitations are aimed at preserving cold water species which do not exist in Texas. In addition, these limits are generally applicable to plants located on flowing streams where water is used on a once-through basis, conditions which generally do not occur in Texas.

In discussing the problems associated with the development of water quality criteria for aquatic life, Tarzwell (1) has pointed out that temperature criteria will vary not only with the species concerned but also with the section of the country involved and that separate criteria will be required for fresh waters that contain cold water species, warm water game species, and coarse species.

Natural water temperatures in the Southern United States may be 20° F or more above those in the North, and Southern fish and other aquatic wildlife are acclimated accordingly. Median annual surface water temperatures in the United States vary from 70° F or higher in the South to 39° F or less in the North and there are more than 100 days per year, on the average, when surface water temperatures in most of Texas and the South generally are 80° F or higher as compared to about one-half as many days in the Midwest and none in the North. (2) Water temperature data taken in 1964 as reported by the U. S. Geological

Survey(3) include numerous samples of surface water from all over Texas whose temperatures were above 95° F under natural conditions in the summer months. Since these were "grab" samples and water temperatures vary widely with time and location, it may be assumed that appreciably higher temperatures actually occur.

Research which has been done in Texas, both by private industry and public agencies, has substantiated the belief that the present uses of water for cooling have, in many cases, been beneficial to fish life. Studies made by the Texas Game and Fish Commission at Lake Colorado City, Texas(4) and by Professor T. R. Hellier, Jr. at Lake Arlington(5) both cite the apparent beneficial effect of power plant operation on the biological characteristics of the reservoirs. At both of these lakes the temperature of the water discharged from the power plants exceeds 100° F during high load periods in the warmest months. An article in Texas Parks and Wildlife magazine of August 1966(6) concludes, "Colorado City Lake probably always will rank high as a game fish producer because of the hydrological and thermal effects created by the electric plant. With them, Lake Colorado City never will be classed as just another mediocre West Texas lake."

Texas Electric Service Company commissioned the consulting engineering firm of Freese, Nichols and Endress to make a review of available information and a survey of public agencies and others who own or operate water supplies used for cooling in the state. The results of this study(7) showed that there were no instances in Texas where the quality or quantity of fish life was being impaired by the discharge of heated effluent from a power plant. The data included numerous instances where fish were abundant in waters whose temperatures exceeded 100° F during the summer months. A report of this study is attached.

Because of these factors, and after numerous discussions with the staff of the Health Department and our own consultants, we believe the temperature criteria should be stated in terms of a maximum permissible average temperature in each zone during the warm weather months and should be based upon sampling done at frequent enough intervals that a true time average figure is obtained. In all instances we have studied so far, a limit of 100° F average in the summer appears reasonable and not detrimental to other uses of the water."

The Company respectfully refers the commission to an article in the Journal, Water Pollution Control Federation, by Dr. Richard D. Hoak, entitled "The Thermal Pollution Problem", Vol. 33, No. 12, Page 1270, Year 1961. We quote, "The maximum lethal temperature for most warm water fish may be 104° F."

It is therefore respectfully requested that the criteria be amended as herein set forth.

In conclusion, the Company wishes to express appreciation for the enormous job this commission is doing to clear the problem of water pollution in our state's water. We remain ready to be of service to the commission and its executive secretary in any way we can.

DCL:eh
Enclosure

D. C. Lutken, Chief Engineer
Mississippi Power & Light Company
April 21, 1967

Report
on
Water Quality Criteria for Texas
February 24, 1967

At hearings held by the Texas Water Pollution Control Board during the summer of 1966, a number of statements were filed which raised serious objection to the temperature standard proposed at that time as a part of the water quality criteria for Texas: "temperature - will not increase the ambient water temperature more than 2° C. at 100 yards from the point of discharge."

It was pointed out that this criteria could result in curtailment of the operation of electric power plants as well as other industrial plants using water for cooling purposes and would seriously restrict the future development of electric power in Texas. It was also stated that there is no evidence that the present use of the waters of Texas for cooling purposes has been harmful in any way to other uses of the water, including its use for fish and wildlife and for recreation. Indeed, cooling use has apparently been beneficial to fish life in many cases.

Because of the importance of this matter, there was formed the Electric Utilities of Texas Committee on Water Quality, composed of representatives of utility organizations comprising approximately 95% of the electric energy supply in Texas.* This report presents the results of the committee's work to date and background information on the temperature criteria problem.

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*Agencies represented on the committee are:

City of Austin
Brazos Electric Power Cooperative, Inc.
Central Power and Light Company
Community Public Service Company
Dallas Power and Light Company
El Paso Electric Company
Guadalupe-Blanco River Authority
Gulf States Utilities Company
Houston Lighting & Power Company
Lower Colorado River Authority
San Antonio Public Service Board
South Texas Electric Cooperative, Inc.
South Western Electric Power Company
Southwestern Public Service Company
Texas Electric Service Company
Texas Power and Light Company
West Texas Utilities Company

I

The use of water for the dissipation of heat is necessary to the thermodynamic cycle of all modern steam-electric powet plants. Water used in this service acts as a heat transfer medium and as a heat dissipative agent. In the typical power plant use in Texas, water is circulated through the plant condensers where its temperature is increased about 15°F. The heat that is thus added to the water is then transferred to the environment in one of two ways: either the water is recirculated within a large body of water such as a bay, lake or estuary, or the heat is dissipated by passing the water over a cooling tower. The former is by far the preferred method and is used by about two-thirds of the electric generating capacity in Texas.

Warm water from a power plant reentering a body of water mixes with the receiving water and the net effect on the total water body is an increase in temperature of only a few degrees, although water temperatures in the vicinity of the discharge may be several degrees warmer than the overall water temperature. The heat that is added is dissipated through a combination of evaporation, radiation, convection and conduction and there is no cumulative build-up of temperature such as might occur when chemical wastes are added to a lake which has no through-flow. The slight increase in surface water temperature that occurs is sufficient to dissipate the added heat.

The concern of the electric utilities with the water temperature criteria now being formulated arises from the fact that unduly restrictive criteria would prevent or interfere with the operation of power plants on lakes and other bodies of water, thereby requiring the use of the only alternative means of cooling available, cooling towers, at tremendous additional cost.

II

In general, concern with water temperature is related to its effects upon fish and other aquatic life. It has become apparent that there are serious deficiencies in our knowledge of these effects in the south. This is a matter of concern to the committee because of the tendency, in the absence of quantitative data, to seek to use temperature limitations developed for northern waters in spite of the fact that these limitations are aimed at preserving cold water species which do not exist in Texas. In addition, these limits are generally applicable to plants located on flowing streams where water is used on a once-through basis, conditions which generally do not occur in Texas.

In discussing the problems associated with the development of water quality criteria for aquatic life, Tarzwell (1) has pointed out that temperature criteria will vary not only with the species concerned but also with the section of the country involved and that separate criteria will be required for fresh waters that contain cold water species, warm water game species, and coarse species.

II (Continued)

Natural water temperatures in the southern United States may be 20°F. or more above those in the north and southern fish and other aquatic wildlife are acclimated accordingly. Median annual surface water temperatures in the United States vary from 70°F. or higher in the south to 39°F or less in the north and there are more than 100 days per year, on the average, when surface water temperatures in most of Texas and the south generally are 80°F. or higher as compared to about one-half as many days in the midwest and none in the north.(2) Water temperature data taken in 1964 as reported by the U. S. Geological Survey (3) include numerous samples of surface water from all over Texas whose temperatures were above 95°F. under natural conditions in the summer months. Since these were "grab" samples and water temperatures vary widely with time and location, it may be assumed that appreciably higher temperatures actually occur.

Research which has been done in Texas, both by private industry and public agencies, has substantiated the belief that the present uses of water for cooling have, in many cases, been beneficial to fish life. Studies made by the Texas Game and Fish Commission at Lake Colorado City, Texas (4) and by Professor T. R. Hellier, Jr. at Lake Arlington (5) both cite the apparent beneficial effect of power plant operation on the biological characteristics of the reservoirs. At both of these lakes the temperature of the water discharged from the power plants exceeds 100°F. during high load periods in the warmest months. An article in Texas Parks and Wildlife magazine of August 1966 (6) concludes, "Colorado City Lake probably always will rank high as a game fish producer because of the hydrological and thermal effects created by the electric plant. With them, Lake Colorado City never will be classed as just another mediocre West Texas lake".

Texas Electric Service Company commissioned the consulting engineering firm of Freese, Nichols and Endress to make a review of available information and a survey of public agencies and others who own or operate water supplies used for cooling in the state. The results of this study (7) showed that there were no instances in Texas where the quality or quantity of fish life was being impaired by the discharge of heated effluent from a power plant. The data included numerous instances where fish were abundant in waters whose temperatures exceeded 100°F. during the summer months. A report of this study is attached.

But perhaps the most striking evidence of the beneficial effects of power plant operation on reservoirs is the extreme popularity of the power plant discharge areas with fishermen. This phenomenon, known to all Texas power plant operators, suggests to the committee that a severe restriction on the operation of power plants on lakes and bays would be more likely to bring protests than thanks from the local anglers. In his letter in response to the Freese, Nichols and Endress survey, Mr. Lawrence S. Campbell, Fisheries Biologist of the Texas Parks and Wildlife Department concludes: "To date I have never observed an instance where fish were killed by the discharge and I have always viewed these structures as production boons".

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III

It is recognized by informed authorities that relationships between water temperatures and aquatic life are very complex and that there are many factors which can influence them. Because of the growing importance of the subject and the present information gap in the south, the Texas utilities have agreed to support a three and a half year research project on the effects of heated water discharges on fish. This will be carried out by the Department of Wildlife Science at Texas A&M University and will utilize data to be gathered from four sites in Texas, including both impoundments and estuaries, in order to study a variety of physical conditions. It is anticipated that the project will be done in cooperation with the Texas Parks and Wildlife Department, the Texas Water Pollution Control Board, the Texas Water Development Board and the various river authorities and other agencies and will use data from these agencies and other studies that may be applicable. The total budget is $195,632, all of which will be contributed by the utilities.

A number of companies have also supported or conducted research efforts of their own, as noted in the Freese, Nichols and Endress report, and the Edison Electric Institute has undertaken a substantial research effort nationally in cooperation with Johns Hopkins University. Out of all of these studies should come a better understanding of the problems, if any, that may exist in connection with the use of Texas waters for cooling purposes.

IV

One of the problems encountered in attempting to set specific water temperature criteria has been the difficulty of anticipating all of the physical conditions which may influence the temperature of the water at a given point at a given time. There are so many possible variables in the hydraulic characteristics of rivers, bays and reservoirs and in the climatic conditions that can affect their water temperatures that it is virtually impossible to set an unqualified specific temperature limit which would not be exceeded under some circumstances, not necessarily harmful, without setting the limit so high as to be meaningless. For example, the path of the warm water reentering a body of water from a power plant depends not only upon the shape of the receiving basin and the temperature and density differences that exist within it but also, quite critically, upon the wind speed and direction. Also, as has been noted, natural water temperatures may be unusually high at times.

Because of these factors, and after numerous discussions with the staff of the Health Department and our own consultants, we believe the temperature criteria should be stated in terms of a maximum permissible average temperature in each zone during the warm weather months and should be based upon sampling done at frequent enough intervals that a true time average figure is obtained. In all instances we have studied so far, a limit of 100°F.

average in the summer appears reasonable and not detrimental to other uses of the water.

We recognize that an average temperature limit has the drawback that much higher temperatures could in theory occur on occasion. However, as a practical matter, we do not believe that this will be a problem. Most industrial operations, including power generation, operate at high load factors in the summer and if heat loading conditions on a given body of water are limited to those which would not cause water temperatures during the summer months to exceed 100°F. average with respect to time, the occasional warmer water temperatures which will occur will be those caused by natural conditions and will not be excessive. We would point out, too, that power plant design already imposes its own limitation on the amount of heating which can be permitted because power plant efficiency and capability both fall off as intake water temperatures approach 100°F. The utilities have for some time recognized this in their own planning and have limited the amount of installed generating capacity accordingly.

Since the state has been and is continuing to regulate water discharge temperatures under the waste disposal permit system, there already exist adequate means to prevent excessive water temperatures due to any particular discharge. Furthermore, if it is found that there are situations where temperature problems exist in spite of these controls, the Texas Water Pollution Control Board has the authority to change the criteria.

As our research project progresses and as experience is gained in applying the water quality criteria now being established, we will have a much better understanding of the beneficial and harmful effects of each of the items being evaluated. We consider this to be a matter of continuing importance, not only because of its effects upon our own operations, but also because our prosperity depends upon the continued growth and prosperity of the areas we serve, and we pledge our full cooperation now and in the future.

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137<

BEFORE THE FEDERAL WATER POLLUTION CONTROL COMMISSION

RE: MEETING OF JANUARY 17, 1968
BILOXI, MISSISSIPPI

STATEMENT OF MISSISSIPPI POWER & LIGHT COMPANY

Mississippi Power & Light Company, in response to the notice of meeting with regard to the above matter, submits the following statement.

Mississippi Power & Light Company, hereinafter called the "Company", supplies electric service to the Western half of the State of Mississippi. The Company serves approximately 209,000 customers in an area of 20,306 square miles. Our annual payroll is approximately $10,000,000. We have a total of $295,000,000 utilities plant investment in our area.

To serve our customers with low cost energy, we have four steam generating stations located as follows:

Rex Brown Steam Electric Station	Jackson
Natchez Steam Electric Station	Natchez
Delta Steam Electric Station	Cleveland
Baxter Wilson Steam Electric Station	Vicksburg

Our Vicksburg station is located on the Mississippi River, and is , to date, the only station affected by the new Interstate and Coastal Waters Quality Criteria. Future plants will have to be located at or near the larger bodies of water in Mississippi that are, or will be affected by these regulations. The addition of a second unit of 750 MW capacity for our Vicksburg plant is now in the engineering stages.

The Company has been aware of the importance of water resources, their usage and conservation. The Company pays Federal, State and local taxes of over $14,000,000 per year, some of which are directly paying for a wide range of water resource development for the public's benefit. Lake Hico here in Jackson is an example of local government and private industry cooperating for the maximum use, conservation and enlargement of our natural resources.

Water Usage

Our Vicksburg plant, the Baxter Wilson Steam Electric Station, is the largest plant in our system. It has the newest, most modern, and efficient unit in existence today, costing approximately $44,000,000. Water to cool and transform the steam into water is pumped from the Mississippi River at a rate of 168,000 gallons per minute. The water is unchanged and unharmed as it passes through our heat exchangers, gaining only a few degrees in temperature. The samll amount of heat picked up by the water is soon dissipated in a relative small area immediately down stream from the discharge pipe, located about 100 feet from the low water level of the bank. This fast dissipation has been confirmed by tests at our plant and test results have been furnished to the Mississippi Air & Water Pollution Control Commission.

Water Temperature Standards

As early as November of 1966, when the first hearing was held by the Mississippi Air & Water Pollution Control Commission, the Company asked said Commission to base its temperature criteria on a rise of temperature - say 10° F above ambient, without consideration, in most cases, to a maximum.

Today, we find ourselves, as well as other companies in Mississippi, on the threshhold of a limiting temperature regulation which will eventually affect every customer, every industry and industrial prospect.

The installed cost of cooling towers in a steam electric station is approximately 10% of plant cost. This equipment also increases operating and maintenance costs by approximately 10%. Naturally, all expenses incurred in generating electricity must form a part of the Company's rate base which will affect all of our customers.

Cooling towers are consumptive users of water. For every 10° F cooling range, there is a 1% evaporation loss plus other losses due to windage and blowdown.

With an approach of 15° F to the wet bulb and recirculation of 200,000 gpm, or 288 million gallons per day, which is an estimated figure of flow for our recently announced 750 MW second unit at Vicksburg, a conservative evaporation of 2% would consume approximately 5.7 million gallons of water per day. By comparison, the City of Jackson consumes an average of 17.4 million gallons of water per day, based on an annual average.

The above clearly indicates that the conservation of our water resources is best served by regulations or criteria which will not require electric utilities to utilize cooling methods that, of necessity, irrevocably consume large amounts of water.

We have previously furnished the Mississippi Air & Water Pollution Control Commission information which indicates that present standards applied generally in the Northern sections of the United States are neither realistic nor applicable to the Southern regions of the Unites States.

The Company realizes that it is necessary for our State Air & Water Pollution Control Commission to adopt water criteria which will comply with the standards of the Federal Water Pollution Control Commission. However, the Company feels compelled to show the Federal Water Pollution Control Administration that it is not in the best interest of water conservation in Mississippi to adopt water criteria unsuitable for this area. It is the desire of the Company to cooperate with the Federal Water Pollution Control Administration and the

Mississippi Air and Water Pollution Control Commission in every way in order that water usage, management, and criteria will be adopted which will accomplish the purposes intended.

We feel the suggestions hereinafter set out will result in criteria best suited for this area of the United States, will avoid the installation of expensive and unnecessary cooling equipment, and will avoid unnecessary waste of our water resources:

1. That the temperature, Section III 1 (c), 2 (c), 3(c) 4 (c), 5(c), and 6 (c) read as follows:
   "Temperature: Shall not be increased more than 10° F above the intake natural prevailing background temperature after reasonable mixing of discharge water with surrounding waters."

The Company wishes to make as part of our record the following:

A. Adoption by reference and inclusion of our statement to Commission at the hearing at Vicksburg on April 6, 1966. We include in that statement, and make it an attachment here also, the report of the Electric Utilities of Texas Committee on Water Quality.

B. We ask the Federal Water Pollution Control Administration to review and use to the benefit of our industry in whatever manner the Administration sees fit, the article appearing in Industrial Water Engineering magazine, entitled "Misunderstanding about Heated Discharges." This article is by Professor Charles B. Wurtz, a recognized authority in this field. In this regard, we further ask that the Administration consider the use of other Environmental Science and Ecologist, of nationally recognized proficiency, to comment and lend their assistance on this matter.

C. The Company wishes to adopt as a part of this statement a letter dated April 7, 1967 from Stewart Udall, Secretary of the Interior, to the Federal Power Commission showing that a heated discharge from a large nuclear station was not deleterious to the recreation resources. Please note that reference in said letter to the case of the Oconee Nuclear Station, now under construction, on proposed Lake Keowee in South Carolina. Consultants employed by the Department of Interior predicted a peak temperature of 103° F at the discharge point of the plant into Lake Keowee. The consultants found that this temperature would be quickly dissipated at that point, and as a result of these findings and confirmation by the consultants, Secretary of the Interior, Udall, wrote, in part, as follows: "In consideration of the above findings, we conclude that the thermal affects of Site 'L' (Oconee Power Plant) 3000 MW plant would produce no detrimental effects upon fishery resources within the Lakes Jocassee or Keowee." He further stated, "This study reveals that water discharged from the plant into Lake Keowee would be warmed to a temperature ranging from 16° to 19° above the temperature of the water obtained from the lake. We do not expect that this discharge would affect a sufficient amount of the surface acreage of the reservoir to be deleterious to the recreation resources." For the Commission's record, this letter is attached to our statement. We then call your attention to the fact that the role of heat dissipation, in a particular case, has been established and passed by the Secretary of the Interior.

At our own Delta Steam Electric Station in Cleveland, Mississippi, where a one mile square lake is used for cooling purposes, fish abound throughout the entire area, and the best fishing spots, according to our own employees, are at the point where our heated discharge enters the North side of the lake. Bass, Bream and Catfish, in quantities, can be caught year round.

D. The Company feels that there should be more study to determine the effect of heated discharge on stream ecology before an unreasonable standard is adopted, and enforced. The Company wishes to remind the Federal Water Pollution Control Administration of Congress' specific charges in the Appropriations Committee report of July - to the Secretary of Interior and to the public:
"As the power to control water quality and quantity is not only the power to make or break business and agriculture but is a power over the life of the nation itself, it is essential that the Federal Water Pollution Control Administration not only closely coordinate its plans and activities with all the Federal agencies involved, but also with each

of the States, local jusisdictions, and private interests affected by the program. The imposition of restrictions and controls without full and equitable consideration of the essential and varied interests involved in water supply, including priority of use and riparian rights, could have a most serious adverse effect on the various segments of the economy dependent upon water for their existence. The Committee wishes to emphasize the importance, therefore, of the new Administration undertaking its most difficult and essential program of water pollution control with a sense of balance and caution to assure any disruption or adverse effects on the economy are minimized."

Seasonal standards should also be set so as to allow for increased heat absorption at lower temperatures. For example, a range of 10° maximum rise might be met in one instance, at say 85° ambient water heated to 95°, a seasonal change might occur and 55° available water is heated to 70° or 15° F range, which in no way may effect aquatic life in a particular area.

WHEREFORE, premises considered, Mississippi Power & Light Company submits and files this its statement and request that upon a hearing hereof the Federal Water Pollution Control Administration will adopt water criteria in keeping with the recommendations herein set out.

Respectfully submitted,

MISSISSIPPI POWER & LIGHT COMPANY

By: ______________________
D. C. Lutken, Vice President
and Chief Engineer

MISUNDERSTANDINGS ABOUT HEATED DISCHARGES

1. An increase in water temperature will cause a reduction in the capacity of the water to retain dissolved oxygen to the extent that aquatic organisms will be harmfully affected.

2. An increase in water temperature to the extent that the annual average temperature of the aquatic environment is correspondingly increased will cause a deterioration in the "quality" of the biological community, i.e., less desirable species of organisms will replace more desirable species. This is usually argued as an increase of "only two or three degrees" without any scale being mentioned.

3. An increase in water temperature during the spring spawning season for fish will cause these animals to spawn earlier, and at a time when suitable food organisms for survival of the young stages will not be present.

4. An increase in water temperature will change metabolic rates to the extent that individual organisms will be living under conditions of physiological stress, and thus be vulnerable to adverse conditions they may have otherwise resisted.

5. An increase in water temperature may cause an increase in the numbers of predators, parasites, and/or pathogens, and thus cause significant deterioration of a fisheries resource or create a public health hazard.

COMMENTARY....

by Charles B. Wurtz

There are some common, widespread misunderstandings about the effects of heated discharges on aquatic life . . . even among professional biologists (see above). This article will discuss each point in turn. In exploring these misunderstandings, however, it is important to bear in mind that they are interdependent and comments under each do not exclude some consideration of the others.

Point 1

As to the first item that increased water temperatures will seriously deplete oxygen resources, this is based on certain physical laws that are true under theoretical conditions. As the temperature of pure water is increased the saturation of gases in water is lowered. When the physical aspect of this is reviewed we find that water must reach 212°F before all gases are driven out of solution. The solubility of oxygen in pure water is such that 4.5 ppm is the saturation value at 140°F (the highest artificial stream temperature with which I am acquainted).

At 100°F the saturation value for oxygen is 7.0 ppm. It is apparent that theoretical temperature effects alone are not biologically limiting at any temperatures now known to occur in our surface waters. It is also well known that theoretical conditions never exist in the field. There is always a trend toward equilibrium between temperature and saturation.

Experience shows that in quiescent waters with good algal growths supersaturation is generally found on sunny days, and something less than 100% saturation is found under other conditions. In nature we are never faced with "pure" water.

A typical example of deviation from theoretical values was shown by a study[1] of the Schuylkill River made in August, 1960. A temperature and dissolved-oxygen study was made covering 47 miles of this river. Between 8 a.m. and 7:30 p.m. a total of 32 samplings was made of surface water characteristics. The lowest recorded temperature was 31°F, and this was associated with the lowest dissolved oxygen content, 5.0 ppm. The maximum recorded temperature was 98.5°F, which was associated with 12.0 ppm of dissolved oxygen.

A maximum dissolved oxygen concentration of 15.3 ppm was found at 7:30 p.m. associated with a water temperature of 90°F. A six-station survey made along five miles of this river during 1958 produced 73 species of macro-invertebrates. A mixed fish fauna, including both largemouth and smallmouth bass, was also present.

Point 2

With regard to the second point that an increase in annual average temperature will cause a quality deterioration, this reflects personal opinion and is a subjective consideration. Waters can be, and, indeed, have been warmed so that a former trout stream is now a bass stream. However, the concept of deterioration depends upon whether you prefer trout or bass. This argument against temperature increments is usually offered by the trout school of thought. These anglers usually ignore the fact that panfish probably provide a thousand-fold more hours of recreation than do trout.

All species of organisms in any group form a graded series in relation to an environmental characteristic. A typical example of this was presented by Walshe[2] who worked with midge larvae. The thermal index (22-hour LD_{50}) of seven species was:

Tanytarsus brunnipes	84.2°F
Prodiamesa olivacea	86.0°F
Anatopynia nebulosa	86.9°F
Chironomus riparius	94.1°F
Chironomus albimanus	95.0°F
Chironomus longistylus	95.9°F
Anatopynia varia	101.8°F

The implication here is that these same species would form the same sequence relative to a preferred environmental temperature. Obviously warming waters will induce a change in the species composition of a community, but how many people will notice a change, for example, from *Anatopynia nebulosa* to *Anatopynia varia*. (I can only think of half a dozen out of our 80 million population.) Any species change among the fish would be noticed, of course, but whether or not this is objectionable is purely personal opinion.

Point 3

The third misunderstanding is that a temperature increase may induce out-of-phase spawning so that essential food organisms are not present for the young fish. I have never seriously considered this argument. Probably because I have never understood why warmed waters would induce earlier spawning in fish but not in fish-food organisms. To the extent that reproduction and growth are functions of temperature they will be affected in all species of organisms.

I know of no fish where the fry are limited to a single microscopic species for its food. Most fish forage widely and use what is available. Food organisms will be present in artificially warmed waters as well as waters of ambient temperature. They may even be present in greater abundance because an increase in the length of the growing season is reflected in an increase in net biological productivity.

Point 4

The fourth item, that an increase in water temperature will alter metabolic rates, is true. However, temperatures must approach the maximum tolerable temperature for a species before physiological stress develops. In nature fish *choose* to remain in waters that are warmed. When given a free choice within a temperature gradient fish generally select a temperature close to their maximum tolerable temperature. This is reflected in the public recognition of improved fishing below warm-water discharges.

Trembley[3] published on four years of fish sampling in an artificially warmed area below a heated discharge entering the Delaware River. During these four years 4,256 fish representing 37 species were collected. Using Trembley's data I developed some rank order correlation values (r) for some facets of fish distribution at that location. These correlation values were derived for number of fish species present during each month versus the maximum and minimum temperatures for each month at three locations (see inset).

Number of Fish Species
versus
Max. Monthly Temp. ($r = .779$) and
Min. Monthly Temp. ($r = .621$)

Max. monthly temp. 1500′ below discharge, $r = .770$
Min. monthly temp. 1500′ below discharge, $r = .682$
Max. monthly temp. 4500′ below discharge, $r = .721$
Min. monthly temp 4500′ below discharge, $r = .658$

On a year-round basis 21 of the 37 species were present for at least three months of the year, 16 species for at least six months of the year, and ten species for at least nine months of the year.

A correlation value of .758 was found for the ten species present at least 75% of the time versus the maximum monthly discharge temperature. Incidentally, these ten species included largemouth and smallmouth bass as well as the walleye pike. The maximum monthly temperatures for the discharge ranged from 70°F in December to 108°F in July, while the minimum monthly temperatures for the discharge ranged from 68°F in February to 100°F in July.

These fish were present in these waters through choice — they were natural wild stock and not experimental animals. Metabolic rates for these fish undoubtedly were increased in the warmed water, but surely these fish were not deliberately subjecting themselves to an environment where they would be under physiological stress.

Fish do show temperature preferences and will withdraw from waters that are too warm for their comfort. Obviously they were not living in the hottest water in the area, but, equally obviously, they were attracted to waters artificially raised above normal ambient temperatures.

Point 5

The fifth item, that increased water temperatures

147<

[illegible] predators, parasites, and/or pathogens, has always irritated me. The biologist who first offered this argument simply was not thinking clearly. Every biologist should know that the size of a predator population is a function of the productivity of the environment. Predators increase in numbers following an increase in productivity. Only to the extent that warmed waters increase productivity will predators increase in numbers. And we would be in sad shape without them as any game manager can tell you.

Parasites, and especially endoparasites, are far less resistant to environmental changes than are free-living forms. These organisms have evolved toward life in a very stable environment and can withstand only slight environmental fluctuations. This is reflected in the massive numbers of eggs they produce. Even under ideal conditions what is the probability of the so-called white liver grub completing its life cycle? It must pass through an entomostracan crustacean, then a fish, then a heron. Between each of these hosts it must adapt to the external environment. It is highly vulnerable to adverse environmental conditions as are all endoparasites. In point of fact, heated discharges may help reduce the incidence of parasitism.

Human pathogens, as represented by the bacteria, do not reproduce in water. As a matter of fact their persistence after discharge into water is chiefly a function of temperature: the higher the temperature the faster the die-away rate. In this respect a heated discharge can be a decided benefit.

Viewpoint

Now I would like to offer some comments on the real nub of the situation, i.e., that an increase in water temperature may be so great that the levels of temperature tolerance by aquatic organisms will be exceeded. This can happen; this has happened; and, I believe, this will continue to happen. But is this the latter-day horror it's painted? I do not think so.

All the current state water quality criteria I have seen speak of multiple water uses. At the same time most of them want fish in every acre of water. This is unrealistic. Other commonly accepted water uses are often antagonistic to fish. The farmers in a semi-arid climate cannot be expected to refrain from diverting water to their fields even though they reduce the volume of water available for aquatic life in a natural channel.

The structural facilities at every port and marina cannot be dismantled just because potential spawning sites are covered. We cannot stop cultivating the land even though we know siltation is destructive of stream bottoms. And, further, we cannot deny the use of our waters for waste disposal, because as long as the rivers flow into the seas they are going to carry the waste of the land and everything on it.

Rejected Heat

One of the wastes of the land is degraded energy in the form of heat. If engineering skills were perfect this would not occur. Rejected heat does have one very helpful attribute. It dissipates. As a result a heated discharge affects only a limited area within a receiving water. Admittedly, if the heat rejection is great enough serious biological damage will occur within the immediate area of influence of the discharge. Temperatures, however, would have to be higher than anything we have today to create what has been called a "biological desert."

Temperatures would have to persistently exceed 130°F to destroy the micro-organisms that are responsible for the self-purification capacity of a lake or stream.[4] In 101 thermal surveys made below 22 power stations in Pennsylvania[5] 18 showed discharge temperatures as high as, or greater than, 100°F. (The highest discharge temperature was 115°F.) Of these 18 only two had temperatures at or above 100°F for a distance of one mile below the discharge.

If heat were the only deterrent to aquatic life in the various watercourses concerned these waters would be far removed from "desert" conditions. Fish would not be expected to inhabit areas with persistent temperatures above 90°F. Nevertheless these discharges would not kill fish since fish have the wit to avoid lethal temperatures. Conversely, since lethal temperatures for fish due to heated discharges are seasonally transient, fish would reinvade the area when the temperature lowered.

Mixing Zones

Each of these discharges was utilizing some part of the river as a mixing zone. The size of the mixing zone varied with volume of discharge and the size and hydraulic characteristics of the receiving water. This mixing zone is just as important to the industrial water user as is indoor plumbing for a modern hotel or a pier for an ocean liner.

Bear in mind that a toilet bowl is a mixing zone receiving a discharge at 98.6°F. The trickling filter of a sewage treatment plant is also a mixing zone. Since we cannot build such a plant with 100% efficiency there must also be a mixing zone below the outfall. Mixing zones are associated with all natural and artificial water uses ranging from minutiae such as fallen leaves and outboard motors to major influences such as massive floods and nuclear reactors.

Summing Up . . .

There are many phenomena that influence aquatic life. But with proper controls there is no reason to envision massive biological destruction. Honest recognition must be given the water needs of interests other than the fish. Man, too, is expected to inhabit the surface of the earth. ■

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IWE AUTHORS

C. E. Renn . . . . ***Serendipity at Hampstead***

An accidental and fortunate discovery — "serendipity" — was the side result when a Hampstead, Maryland plant corrected a hydrogen sulfide problem in its commercial waste lagoon. Followup studies on the pond, made by Black and Decker Manufacturing Company personnel, have revealed new guidelines for designing tertiary treatment systems for water re-use and for reducing the fertility of industrial wastes.

The author who shares this serendipity with IWE readers is Charles E. Renn, Professor in the School of Environmental Engineering Science, Johns Hopkins University, Baltimore, Maryland. With Johns Hopkins since 1946, Dr. Renn has also been associated in a civilian capacity with the Office of Science, Research and Development; National Research Council; National Institutes of Health; Atomic Energy Commission; and the Office of Naval Research. He holds a Bachelor of Science degree from Columbia University, a Master of Arts degree from New York University, and a Ph.D. in microbiology from Rutgers State College. He was made an Honorary Master of Arts at Harvard University in 1944.

C. E. RENN

C. B. Wurtz . . ***Common Misunderstandings About Heated Discharges***

Pointing out that "Man, too, is expected to inhabit the surface of the earth," the author takes up five common misunderstandings about the effects of heated discharges on aquatic life and discusses each one in detail.

Charles B. Wurtz is Assistant Professor of Biology at La Salle College, Philadelphia, Pennsylvania, and Editor of *The Nautilus*, a quarterly scientific journal devoted to malacology. Dr. Wurtz received B.S. and M.S. degrees from the University of Pittsburgh. He held an undergraduate scholarship to Cold Spring Harbor Biological Laboratory, Long Island, and a graduate scholarship to Woods Hole Biological Laboratory, Woods Hole, Massachusetts. He earned a Ph.D. degree from the University of Pennsylvania and has done advanced study through U.S. Public Health Service courses at Taft Sanitary Engineering Center, Cincinnati, Ohio. Author of more than 60 publications in the field of biology, Dr. Wurtz is also a member of numerous professional societies.

C. B. WURTZ

W. H. Jukkola . . . . . . ***Flow Diagram for a New Steel Mill***

There is an old saying that "foresight is the result of 20-20 hindsight." One advantage of having accumulated a store of hindsight in the field of water and waste treatment is that today constructing a new mill can profit from advance planning in water management. In this article the author describes how the exercise of "foresight" has created greater efficiency and economy in the use of water at a new Midwestern steel mill.

W. H. Jukkola, Technical Coordinator of Industrial Wastes Control, Jones & Laughlin Steel Corporation, has coordinated J&L's activities in the abatement of air and stream pollution since 1966. Prior to joining the company in 1939, Dr. Jukkola was a Physical Science Aide with the Tennessee Valley Authority and a Junior Chemist for the National Bureau of Standards. He received his B.S. degree in chemical engineering from the South Dakota School of Mines, earned an M.S. in organic chemistry and a Ph.D. in chemistry from the University of Colorado at Boulder, and also holds a graduate degree in chemical engineering from the South Dakota School of Mines. He has a Certificate in X-ray and spectroscopy from the University of Pittsburgh, and in [illegible] was named a Fellow in the American Association for the Advancement of Science.

W. H. JUKKOLA

Statement before the Federal Water Pollution Control Administration on behalf of the Mississippi-Alabama Division of the Mid-Continent Oil and Gas Association at the public meeting at the Broadwater Beach Hotel in Biloxi, Mississippi January 17, 1968, concerning the importance of estuaries to the economic and social well-being of the people of the United States and of the effects of pollution upon the use and enjoyment of such estuaries.

This statement expresses the opinions of the author on optimum use of estuarine resources, their value, damages incurred due to estuarine pollution, and how the estuarine resources should be managed along with other items felt appropriate to a consideration of the estuaries and coastal waters of Mississippi and other States.

Representing the Mississippi-Alabama Division of the Mid-Continent Oil and Gas Association, and particularly the Water Protection Committee of this Division, of which I am Chairman, I would like to say first that we welcome this study because we are convinced that the future of our country is dependent upon the conservation of all of our natural resources, including estuarine areas, and upon their optimum development for the benefit of all of the people of the nation.

Over the past several years there have been innumerable pronouncements decrying the loss and degradation of marshes and wetlands in estuarine areas. In fact, the Fish and Wildlife Service has tabulated a record indicating a 7.1% (568,800 acre) loss of marine habitat over the past 20 years. Admittedly, this is a serious loss in that this acreage is no longer exclusively assigned to the use of fish and waterfowl. Yet none of this acreage was developed or occupied without mandate from some segment of the public and the full knowledge and consent of some branch of government. Nor was it occupied or developed for other than economic, recreational, navigational and other beneficial uses to the public. These benefits will continue over the years to come and will no doubt return hundreds of millions, perhaps billions of dollars to the economy before their useful life is exhausted.

However, I believe it is safe to say that very little, if any, consideration was given the alteration and disruption of the ecological processes of the disturbed and related estuarine areas involved either before the work was done or after it had been completed.

This very thought, although in different words, is herewith quoted from Page 3 of the U. S. Department of the Interior Conservation Yearbook No. 2, "In layman's language, the gist of a report made in January 1965 by the American Association for the Advancement of Science is that man has been using his power to alter his environment with a blind pursuit of immediate objectives and a disregard of secondary effects that could endanger the very existence of life on this planet. It cites synthetic invasions of the web of life which add up to an appalling list of governmental and private errors."

Unfortunately, I do not have a copy of the report mentioned so I cannot quote any of this list of appalling errors. However, I respectfully submit that the most colossal errors responsible for the loss and degradation of estuarine areas were, and apparently will continue to be, the diversion of fresh waters from these areas.

These diversions are probably necessary if we are to provide water for human consumption, irrigation, navigation and power. We shall probably continue to have to erect dams, flood and hurricane control levees, salt water barriers, etc., and just plainly divert water all over the nation into the foreseeable future.

But, these diversions have drastic ecological effects upon the estuaries with which their controlled streams and rivers are connected.

These diversions deny estuaries the life giving flow of fresh water, which, under natural and unaltered circumstances would provide the nutrients, sands, clays and silts requisite to their maintenance and necessary to combat erosion and subsidence. They further deny the estuaries the diluting effect necessary to maintain the salinities and temperatures at levels conducive to the propagation of marine life, and, necessary to control fungi and parasitic organisms which destroy this life. Finally, these diversions eliminate the flushing action formerly provided by nature to remove natural and man-made pollutants.

Our knowledge of the ecological changes created by these fresh water diversions is practically nil but some highly disturbing, even frightening results, are becoming evident.

The increasing salinity of Chesapeake Bay through fresh water diversion (and drought) has encouraged the growth of a protozoan parasite which is fatal to oysters, to the point where oysters can no longer be grown in at least two-thirds of the Bay. This parasite is gradually moving northward and may conceivably destroy the remainder of the oysters in Chesapeake Bay.

The succession of dams on the Columbia River and its tributaries has obliterated countless salmon spawning grounds--yet we complain over the declining salmon catch--and blame it on overfishing by Japanese and Russian fishermen.

One of the largest estuarine areas in the nation, and a national park at that, the Everglades, may be headed toward extinction because the fresh water formerly flowing through it has been diverted to the East and West Coasts. Some of this diverted water is used for municipal and other purposes but much of it is wasted. Should this diversion continue, the damage to wildlife, waterfowl and marine life will be incalculable, not only in the Everglades but also in many other areas of the nation and perhaps even in the Gulf of Mexico.

The California State Water Project will divert billions of gallons of fresh water from San Francisco Bay, yet to my knowledge, no effort has been made to determine the ecological changes which will most surely result from this diversion. However, it is interesting, but not encouraging from an ecological standpoint, to note that Contra Costa County has finally awakened to the fact that the encroachment of salt water from the Bay into fresh water areas of the delta "could lead to the destruction of more than 100,000 acres of prime farm land."

The Mississippi-Gulf Outlet in Louisiana is visibly changing the flora along its course; it is rapidly raising the salinity of the waters in many former oyster growing areas; and, it has so increased the salinity of Lake Pontchartrain that Spanish Mackerel, Pompano and Sharks, among other salt water fish, are beginning to appear in ever increasing numbers.

I respectfully submit that it is primarily this disregard of ecological changes, and not so much pollution, which is rapidly ruining our estuarine areas.

Without doubt pollution has been a contributing factor in some areas and will continue to be a factor for a short time to come. However, I am confident, under the Clean Water Restoration Act of 1966, and other legislation presently in effect, that pollution attributable to man-made wastes will soon be a minor factor in estuarine degradation; provided, the Federal government meets its commitment to provide funds for municipal construction grants to eliminate sewage flowing into estuarine areas; the public exhibits a willingness to do its part through individual action and through paying its share of the cost of an effective pollution abatement program; and, the various levels of government work in harmony; first, to determine through adequate research the ecology of each estuary involved in this or future studies, and secondly, to determine the best way to maintain the ecological balance most nearly appropriate to the conservational, recreational and economical demands of that particular estuary.

Much has been said and written about pollution by oil. I will agree that pollution by oil creates an objectional mess but it must be and is being eliminated to every degree possible. An objective study of the facts reveal that the petroleum industry in all of its various operations is in the forefront of pollution abatement efforts. In addition, it continues as it has in the past, to demonstrate that it can operate on public lands, in estuarine areas and in both Federal and State waterfowl and wildlife sanctuaries without polluting in any way harmful to their other uses or to any degree significant to their full use and enjoyment.

One small example of the interest of the petroleum industry in eliminating pollution is exhibited by the recently constructed refinery at Pascagoula. The owners of this refinery spent over $10,000,000, about one-tenth of the complete cost, just on water pollution control. Overall, the entire industry spends hundreds of millions annually on the abatement and control of pollution.

It will be noted that the five instances of estuarine damage I have mentioned affect only specific States. It will also be noted that the primary reason for water diversion in each case was different; respectively, largely natural causes, power development, flood control, agricultural purposes, and navigation.

Therefore, the management of estuarine areas must rest with the State or States involved because they only can determine what is best for the welfare of their own citizens. For instance, neither Mississippi nor any other State nor the Federal government can decide objectively what is best for Californians even if they divert all fresh water from San Francisco Bay.

However, I believe that all States should have assistance in planning projects in estuarine areas and that this assistance should be supplied by the Department of the Interior. This assistance could be provided through a Board composed of responsible members of all conservation agencies of Interior. To be meaningful or of any value, this assistance should be based upon facts derived from complete research; on the ecology of each estuary in its present state; on the probable changes in ecology resulting from any estuarine alterations; and, on alternate methods of maintaining the ecological balance.

No successful estuarine program can be consummated or even envisioned, regardless of statements and proposed legislation to the contrary, unless we know the goal to be achieved, and in particular, how to attain that goal.

Only research can provide these answers and I believe the Department of the Interior, with the cooperation of the Marine Science Departments of Coastal States Universities, should begin to provide these answers now.

H. E. DENZIER

January 12, 1967

John R. Thoman, Regional Director
FWPCA, U.S. Dept. of Interior, Southeast Region
1421 Peachtree St. N.E., Atlanta, Ga. 30309

Dear Mr. Thoman,

I have your letter of 14 December, 1967, inviting me to appear at the hearing at Biloxi, Mississippi. I am sorry to say at this late hour that I cannot appear, because of illness. I am sending you two statements, which should be viewed as personal comments, rather than as official statements in connection with my position as Secretary of the Aquatic Ecology Section of the Ecological Society of America. I greatly appreciate the opportunity to participate in this effort, and I am taking steps to involve the members of the Aquatic Section. Please note the appropriate section of the enclosed Aquatic Ecology Newsletter. Also, please note the discussion on our Program Director, Dr. B. J. Copeland, who is engaged in a very active program of research on Texas estuaries, and who would be a very good person to involve in your program.

One of the statements I am sending you is a copy of a paper by J. L. Wilhm and myself on Biological Parameters of Water Quality. This paper, in our view, represents the best effort to date to objectively quantify biological response to water quality. Other efforts fail because they all contain an element of subjectivity, and do not provide concise, clearly-defined, numerical parameters. Our proposed parameter, a species diversity index, provides a single number, usable by engineers and others in the same way as pH, O_2, etc., values.

The second statement is related to the Galveston Bay Work Plan as proposed by Wells, Smerdon, and Gloyna. It is my opinion that the Work Plan is poorly conceived in terms of biological conditions. The authors state that existing data provide a satisfactory basis for evaluation of existing conditions. I recently had occasion to make an intensive study of existing literature on certain waters connected with Galveston Bay, and I found that there are no data which can provide an objective, valid evaluation of biological conditions in Galveston Bay.

Sincerely,

Troy C. Dorris

Troy C. Dorris, Director
Reservoir Research Center

enc: Biol. Par. Water Qual.
Galveston Bay Work Plan
Aquatic Ecology Newsletter

Note: enclosures mentioned in this letter are being sent to Atlanta.

TCD:vkm

GALVESTON BAY WORK PLAN

This is a proposal for the development of a comprehensive water quality managment program for Galveston Bay and its tributaries, prepared for the Federal Water Pollution Control Administration, Department of Interior, and Texas Water Pollution Control Board, by Dan M. Wells, Texas Technological College, Ernest T. Smerdon, Texas A. & M. University, Earnest F.Cloyna, University of Texas, 31 October, 1966.

The Plan proposes studies in four separate functional classes:

1. Evaluation of cost of achieving incremental levels of water quality under different types of management programs.
2. Social benefits that may be derived from alternative Management plans.
3. Effects of changing water quality or marine productivity.
4. Management program.

A schedule has been set up covering a total period of 156 weeks (3 years) for obtaining solutions to problems in the four categories listed above.

This plan is an important document, as it undoubtedly forecasts the general outline of investigations which will be made on Galveston Bay in the near future. Certain topics included in the plan have ecological aspects:

RELATING MARINE PRODUCTIVITY TO WATER QUALITY IMPROVEMENT

Toxic Tolerance Testing:

The responses of shrimp, crabs, oysters, and finfish to different concentrations of toxic materials under varying conditions of freshwater inflow, temperature, salinity and dissolved oxygen concentration will be determined to reveal short-term effects of rapid changes in the variables. Estimates of long-term effects of gradual changes in water quality "can be obtained by a thorough analysis of existing data."

Comments:

$200,000 is allocated to this project over a three-year period. This is a very ambitious program, involving the testing of several dozens of potentially toxic compounds against at least three species of shrimps, one crab, one oyster, and 6-12 species of fishes, at several levels of temperture, dissolved oxygen, salinity and fresh-water dilution, presumbly under conditions of contrinuous renewal of toxicant.

For each toxicant, at only 4 levels of each of 4 environmental variables, with only 4 replications of each test, and for only 4 replications of each test, and for only 12 species, 568 tests would have to be run (4 X 4 variables X 4 replications X 12 species). Nothing less than a testing program as complete as this should be permitted. However, it seems doubtful that meaningful or useful data can be developed by this approach. The great numbers of tests required by the permutation of the variables involved will make this study very costly. The problem is further complicated by the fact that specific compounds are always associated with other compounds which may produce synergistic or antagonistic effects. In addition, results obtained by laboratory testing cannot necessarily be applied to field conditions, where the greater number and range of environmental variables produces unknown and unpredictable effects.

Phytoplankton Studies:

Photosynthetic activity of algae at different seasons, under different conditions of freshwater inflow and water temperature, and with varying concentrations of nutrients will be studied. The purpose is to determine the concentration of plant nutrients that will produce excessive plant growth.

Two kinds of studies will be made:

Measurements of photosynthetic activity by plankton algae, and

Determination of limiting nutrients (N & P) concentrations on the growth of algae.

Comments:

This is a standard approach to the "eutrophication" problem. Eutrophication is the enrichment of waters by the addition of phosphorous and nitrogen from decomposing organic wastes. Such a study would be useful if continued for a long period of time -- ten to twenty years -- as a monitor of the effect of changes in input of organic wastes. The study would be of limited usefulness if conducted for only a short time.

Nursery areas and species diversity:

The location and nature of nursery areas will be determined. Use of certain areas by important commercial species will be determined by seine and trawl hauls, and use will be correlated with salinity, temperature, oxygen and organic matter data. Species diversity indices will be used to give an overall indication of water quality.

Comments:

This type of study will give the best measure of water quality in terms of effects on biotic resources. The plan underbudgets this item. It is our opinion that the toxic tolerance testing and phytoplankton studies ought to be eliminated. Only a fraction of the budget allocated to these two studies would be needed to make the species diversity study adequate.

BIOLOGICAL PARAMETERS FOR WATER QUALITY CRITERIA[1]

Jerry L. Wilhm and Troy C. Dorris[2]

The necessity for water quality standards

In accordance with the Water Quality Act of 1967 (PL89-234), an amendment of the Federal Water Pollution Control Act (PL84-660), each state is required to establish water quality criteria for all interstate waters and to develop a plan for the implementation and enforcement of the criteria. The purposes of the Act are..."to enhance the quality and value of our water resources and to establish a national policy for the prevention, control and abatement of water pollution." By 30 June 1967, all states were to have submitted proposals to establish water quality criteria. If any state does not establish satisfactory water quality criteria, the Secretary of Interior is empowered to set standards for the interstate waters of that state. Guidelines were published by the Federal Water Pollution Control Federation (1) to assist the states in developing the required criteria and plan and to delineate the considerations which will guide the Secretary's determination whether criteria and plan are consistent with the purposes of the act.

In general, the guidelines prescribe that standards be such as to enhance the quality of natural waters for their "...use and value for public water supplies, propagation of fish and wildlife, recreational purposes, agricultural, industrial, and other legitimate uses. Economic, health, esthetic, and conservation values must be taken into account in determining the most appropriate use of a stream."

"Water quality standards will provide an engineering base for design of treatment works... are not designed for use primarily as an enforcement device... Their principal objectives are the orderly development and improvement of our water resources... Water quality criteria should be applied to receiving water... and establish limits on pollutants or effects of pollution necessary to provide for specified uses. Numerical values should be stated for quality characteristics where available and applicable. Biological or bioassay parameters may be used, where appropriate."

Physical and chemical criteria of water quality

It is to be expected that the criteria set for water quality in this first effort will be based largely on physical and chemical conditions. A certain merit exists in this approach, since physical and chemical parameters generally are easily defined. If a method of testing is agreed upon, the results are reproducible and not dependent on human judgment. To the extent these assumptions are true, physical and chemical standards for water quality ought to be satisfactory.

However, chemical substances which affect the quality of water are numerous, act in a great range of concentrations, and vary continuously and erratically in concentration. Samples for chemical testing frequently are obtained on a grab-sample basis and may contain a concentration at any point in the spectrum of concentrations. Chemical surveys indicate stream conditions only at the times of sampling and occasional spills of highly concentrated wastes are not easily detected. Determination of variations in concentration of chemical substances in water on a grab-sample basis is difficult and costly. Continuous monitoring of chemical concentrations by electronic or mechanical means is costly and may not be feasible for many important parameters.

The attempt to establish chemical criteria in terms of toxicity to aquatic organisms is fraught with difficulties, and indeed, may prove to be impossible. The great host of potentially toxic compounds; the vast numbers of species of organisms; the innumerable interaction effects, synergistic or antagonistic, among compounds; and the wide range of effects produced by variations in temperature, dissolved solids, pH, and other physical and chemical factors produces permutations which may exceed the capability of adequate testing. As an example, it is proposed to establish toxic tolerance limits in Galveston Bay (2) for about 12 species of economically important shrimps, crabs, oysters, and fishes at various levels of temperature, pH, salinity, and freshwater flow for chemical toxicants in industrial effluents. Permutations of these few parameters require a large number of tests for each toxicant. The requirement of adequate replication greatly increases the number of tests. Since the number of potentially toxic substances is large, the total number of simple tests required for single substances becomes enormous. Interaction of two or more substances requires further expansion of the testing program.

Toxicity tests generally are conducted on a short-term basis and yield information only on acute toxicity. Testing for long-term effects is much more costly in time and money. Further, results obtained in the laboratory usually are not transferable to the field, where numerous other environmental conditions may produce unpredictable and unaccountable effects. It is doubtful that a complete chemical testing program can ever be financed, and the usefulness of the results is even more doubtful.

When wastes are highly treated chemical testing may not reveal any evident pollutional qualities. However, the receiving stream may be adversely affected by such effluents. Toxic substances too low in concentration to be detectable on a practicable basis may seriously effect populations of aquatic organisms. The deleterious effects of low-level toxicants on human beings who drink or bathe in the water are not known. It is not unreasonable to suppose that water that adversely affects aquatic organisms is not beneficial to humans.

Butcher (3) showed that chemical and biological data differ widely when several types of pollution are involved and urged that pollution be defined in biological terms. We propose here a meaningful approach to the establishment of water quality criteria by the evaluation of biological conditions existing in receiving streams.

The concept of community structure

An ecosystem is a natural unit composed of abiotic and biotic elements interacting to produce an exchange of materials (Fig. 1). Actions of the abiotic environment and coactions between biotic components result in a characteristic assemblage of organisms. The complex of individuals belonging to the different species in the ecosystem is referred to as community structure (Fig. 2).

The widespread similarity in numerical distribution patterns of individuals and species is one of the interesting and unexplained properties of ecological systems. Natural biotic communities typically are characterized by the presence of a few species with many individuals and many species with a few individuals (Fig. 3). An unfavorable limiting factor such as pollution results in detectable changes in community structure.

Methods of analysis of community structure

The assumption that natural communities represent meaningful assemblage has prompted a diverse series of analyses. Community organization has been described in terms of species frequency, species per unit area, spatial distribution of individuals, numerical abundance of species, and diversity indices. Diversity indices are mathematical expressions which describe community structure. They permit summarization of large amounts of information about numbers and kinds or organisms.

Several diversity indices have been proposed. One of the first important attempts to interpret animal community structure was that of Fisher, Corbet, and Williams (5). They concluded that the logarithmic series provides an adequate description of the data and proposed a constant α, as an expression of diversity. Preston (6) stated that the frequency distribution of an animal population is nearest a lognormal distribution; that is, frequency distributions of random samples of ecological assemblages approximate the form of a normal curve on a logarithmic base.

The relationship between number of species and logarithm of the area studied was considered to be linear by Gleason (7). Margalef (8) considered that the area studied is proportional to the number of individuals and used the relationship as a measure of community diversity, d. Thus, $d = (s-1)/\ln n$. Menhinick (9) used the index $d = s/\sqrt{n}$, to describe community structure of field insects.

After a particular diversity expression is accepted and a meaningful agreement is found between the natural community and a theoretical distribution, a characteristic diversity value can be found to express the structure of each community. In most expressions, maximum diversity exists if each individual belongs to a different species and minimum diversity exists if all individuals belong to the same species. The distribution of individuals among species lies between these extremes in most communities and diversity is intermediate.

An important requisite of a diversity index is independence of sample size. Hairston and Beyers (10) attempted analysis of populations of soil arthropods with Fisher's logarithmic series and Preston's log-normal series and concluded that both indices were related to sample size. Menhinick (9) studied the relationship between species and logarithm of individuals and concluded that this ratio was not a satisfactory measure of diversity because of wide variation with sample size.

A diversity index should reflect not only the distribution of species, but should include the relative importance of each species in the community. The structure of the three communities in Table 1 is different; however, the number of individuals, the numbers of species, and the diversity values obtained from $(s - 1)/\ln n$ or $s/\sqrt{n}$ is the same in all three communities.

Since considerable variation in biomass exists within and among species, the relative importance of the various species is more adequately expressed in biomass units than in numbers. Differences in diversity values obtained with biomass units and numbers of individuals are shown in Fig. 4. When biomass units are used the index selected must be dimensionless; otherwise, the values generated will depend on the arbitrary choice of weight units. Several of the commonly used diversity indices do not satisfy the conditions of being independent of sample size, of expressing relative importance of the different species, and of being dimensionless.

Diversity indices derived from information theory

Margalef (11) proposed analysis of mixed-species populations by methods derived from information theory. Diversity is equated with the uncertainty which exists concerning the species of an individual selected at random from the population. The more species present in a community and the more equal their abundance, the greater the uncertainty and hence the greater the diversity. Information content is a measure of uncertainty and thus a reasonable measure of diversity.

The formula given by Brillouin (12) as a measure of diversity (or information) per individual is,

$$\bar{H} = (1/N)\ (\log N! - \sum_{1}^{s} \log N_i)$$

where N is the number of individuals in s species and N_i is the number of individuals in the i'th species. Assuming reasonably large values of N and N_i, the logarithms of the ! functions may be approximated by Stirling's formula to yield

$$\bar{H} = -\Sigma\ (N_i/N)\ \log_2\ (N_j/N).$$

In using $\bar{H}$ as an index of diversity, the ratio (N_i/N) is estimated from sample values (n_i/n) to yield the equation

$$\bar{d} = -\Sigma\ (n_i/n)\ \log_2\ (n_i/n).$$

In addition to calculating a diversity index, $\bar{d}$, based on the distribution of individuals into species, a theoretical maximum diversity, $\bar{d}_{max}$, and a theoretical minimum diversity, $\bar{d}_{min}$, can be calculated.

$$\bar{d}_{max} = (1/n)\ [\log_2 n! - s \log_2 (n/s)!]$$

$$\bar{d}_{min} = (1/n)\{\log_2 n! - \log_2[n - (s - 1)]!\}$$

Then, the position of $\bar{d}$ between these extremes can be calculated by the redundancy expression, R.

$$R = \frac{\bar{d}_{max} - \bar{d}}{\bar{d}_{max} - \bar{d}_{min}}$$

Redundancy is an expression of the dominance of one or more species and is inversely proportional to the wealth of species. A value of 0 is obtained if each individual belongs to a different species and a value of 1 if all individuals belong to the same species.

The value of using both $\bar{d}$ and R is demonstrated in Fig. 5. Although communities A and B have the same $\bar{d}$, the ratio between ($\bar{d}_{max} - \bar{d}$) and ($\bar{d}_{max} - \bar{d}_{min}$) or R is different. Communities B and C have the same R, but $\bar{d}$ is different. Thus, indices derived from information theory permit an expression not only of the compositional richness of a mixed-species aggregation of organisms, $\bar{d}$, but also of the dominance of one or more species, R.

The indices $\bar{d}$ and R possess features which make them reasonable measures of community structure. They are dimensionless equations and numbers or biomass in any units can be used. For example, $\bar{d}$ can be modified to $-\Sigma\ (w_i/w) \log\ (w_i/w)$, where w_i is the sample weight of the i'th species, to obtain a dimensionless index based on biomass units. Diversity is then equated with uncertainty regarding biomass rather than numbers. Further, the relative importance of the i'th species in the community is expressed in ratios representing the contribution of the i'th species to total density or biomass, and estimates of total numbers of species or individuals are not required. The indices also are independent of sample size. Pielou (1966) demonstrated with plant material that as sample size is progressively increased by the addition of new quadrats, the diversity per individual of the pooled sample increases and then levels off. The negligible effect of increased sample size on $\bar{d}$ is shown in Table II. Successive values in each row represent the values obtained by pooling successive samples from one through 10. The value in the first column represents the $\bar{d}$ of the first sample and the tenth value represents the diversity of all 10 samples pooled. Diversity reached 95% of the asymptotic diversity value by the third sample in the meadow, the fourth sample in the stream, the first sample in the spring, and the fifth sample on a population sampling board.

It is unlikely that all species present in the community will be taken in a sampling program. This produces a serious irregularity in assigning a diversity value with an index such as $(s - 1)/\ln n$ or $s/\sqrt{n}$. However, when $\bar{d}$ is used the contribution to total diversity by rare species is small (Fig. 6). Maximum contribution to total diversity will be made by a species that comprises 37% of the sample. Margalef (1956) collected 1032 individuals of phytoplankton distributed among 21 species from the mouth of the Vigo River. The $\bar{d}$ of the community was 2.4. Ten of the species were represented by four individuals or less. If these rare species had not been collected, $\bar{d}$ would have been reduced only to 2.3. If the index $(s - 1)/\ln n$ had been used, the diversity of the community would be 2.9 with rare species included and 1.4 if rare species had been overlooked. This demonstrates the importance of estimating ratios rather than numbers of species and individuals.

Biological methods of analyzing water quality

A number of surveys have demonstrated that effluents produce striking changes in the structure of the biotic community. Some species may be unable to survive and others may persist in reduced numbers. With the resulting reduced coactions, certain species may be able to attain great abundance.

Biotic populations exhibit striking differences in community structure at successive stages downstream in a stream. Each successional stage acts on the water in such a way as to change the quality of the water. A distinctive series of populations can be identified until water quality and biotic structure approach the normal situation.

Community structure of benthic macroinvertebrate populations has frequently been used to evaluate conditions in streams receiving organic enrichment. Bottom organisms are particularly suitable for such studies because their habitat preference and relatively low motility cause them to be directly affected by substances that enter the environment. Extensive studies were made by Richardson (13) on the Illinois River and by Gaufin and Tarzwell (14) on Lytle Creek. Gaufin and Tarzwell emphasized that associations of benthic macroinvertebrates provide a more reliable criterion of organic enrichment than mere occurrence of indicator species. However, such analyses usually involve long descriptions of associations. Quantitative measures which summarize community structure clearly and briefly are needed in evaluating effects of organic enrichment and other pollution.

Information theory methods of analyzing water quality

The structure of the biotic community can be summarized in diversity indices derived from information theory. Large numbers of individuals and small numbers of species ordinarily are found in enriched areas of streams receiving organic wastes. Since some species may be superabundant, a large probability exists that an individual observed during sampling belongs to a species previously recognized. Thus, considerable repetition of information exists, and redundancy is high. Information per individual is low and is reflected in a low index of diversity. Only a few samples are necessary to describe this low-information system, and additional samples are superfluous. Areas above the sewage outfall and downstream clean-water areas contain smaller numbers of individuals and larger numbers of species. Less repetition of information per individual exists and thus information per individual is greater and redundancy is lower than in enriched areas. More samples are needed to describe this system adequately. Stream areas between the two extremes have intermediate values of diversity and redundancy.

Diversity indices were used to describe longitudinal variation in community structure of benthic macroinvertebrates in Skeleton Creek, Oklahoma (15). Municipal and industrial wastes enter the headwaters. Spring and fall values of diversity are shown in Fig. 7. In general, diversity increased progressively downstream. Minimum diversity occurred in the upstream reaches, with maximum $\bar{d}$ at the lowermost station reflecting the more varied fauna and improved stream conditions. Physicochemical conditions such as chemical oxygen demand, biochemical oxygen demand, dissolved oxygen concentration, turbidity, conductivity, and current velocity in middle stream reaches resembled conditions downstream in fall and resembled conditions upstream in spring. This pattern was reflected in $\bar{d}$, since diversity in middle reaches in fall was similar to that downstream, and diversity in spring was lower and similar to upstream values.

Duncan's multiple range test showed that the five upper stations were not significantly different from each other in mean annual diversity but were different from the two lower stations (Fig. 8). Station 61 was significantly different from all other stations except Station 45. Diversity patterns were similar in fall, except that the three upper stations were significantly different from Stations 27 and 32. In spring, the six upper stations were not significantly different from each other, but were different from the lowermost station.

Species diversity, $\bar{d}$, has been applied to other pollution studies (Table III). A second diversity analysis of Skeleton Creek was obtained in August, 1967. Harrel (16) studied community structure of benthic macroinvertebrates in an area of Otter Creek, Oklahoma, that receives oil field brines. Both of these surveys demonstrated a reduction in diversity below an effluent outfall and a progressive increase in diversity downstream. Ewing (17) studied the structure of insect communities in a series of oil refinery effluent holding ponds. Species diversity in June increased progressively from the pond sampled nearest the effluent to the last pond in the series. Ransom (18) found a correlation of -0.93 between conductivity and $\bar{d}$ in Keystone Reservoir, Oklahoma. Diversity decreased from 3.01 where mean conductivity was 2200 mhos/cm to 0.55 where mean conductivity was 4200.

Subjective evaluation of numbers of species or numbers of individuals can lead to erroneous conclusions. Reish and Winter (19) studied the benthic fauna of Alamitos Bay, California. According to the authors, "Stations 28 to 30 were located in the vicinity of oil fields. The air at Station 30 was characterized by a petroleum odor. The substratum of these stations possessed a strong sulfide odor, but apparently pollution has not reached toxic levels, as evidenced by the animals present." Analysis of their data with $\bar{d}$ demonstrated the effects of oil field brine on the biota. Mean species diversity in the vicinity of the oil field was only 1.49 (Table III). Mean diversity increased to 2.50 in the river downstream. Reish and Winter further reported that "oil fields are located south of Stations 7 to 10, but there was no evidence of pollution in this side channel. Animals were abundant at these stations." Application of $\bar{d}$ to their data again demonstrated adverse effects of oil pollution. Mean diversity of Stations 7 to 10 was 1.44 and diversity increased to 2.70 in the downstream bay. Diversity was 1.45 in an area which received a storm sewer outfall and increased to 2.81 downstream.

It is apparent that pollution results in a change in the community structure of benthic macroinvertebrates reflected as a depression in $\bar{d}$. Values less than 1 have been obtained in areas of heavy pollution, values from 1 to 3 in areas of moderate pollution, and values exceeding 3 in clean water areas. Additional work needs to be done to learn how different types and degrees of pollution are expressed in $\bar{d}$.

Application of this method of analysis is relatively simple. Benthic macroinvertebrate populations are sampled at suitable points above and below pollutional outfalls. The distribution of individuals among species is determined by counting, and diversity, $\bar{d}$, and redundancy, R, are derived from the counts. Variation of these indices along the stream then gives a measure of the effect of the effluent on stream water quality as reflected in community structure.

Summary

Each state is required by law to establish water quality criteria for interstate waters. The criteria set for water quality in the first effort probably will be based largely on physical and chemical parameters. Chemical substances which affect the quality of water are numerous, act in a great range of concentrations, and vary continuously and erratically in concentration. The attempt to establish chemical criteria in terms of toxicity to aquatic organisms may exceed the capability of adequate testing due to the large number of toxic compounds, the vast numbers of biotic species, the effects of interaction among compounds, and the wide range of effects produced by variations in physical and chemical conditions.

We propose a meaningful approach to the establishment of water quality criteria by the evaluation of biological conditions existing in receiving streams. Effluents produce striking changes in the structure of the benthic macroinvertebrate community. A distinctive longitudinal series of populations can be identified in a polluted stream until water quality and biotic structure approach the normal situation. The structure of a benthic community can be summarized clearly and briefly in diversity indices derived from information theory. These indices express the relative importance of each species, are dimensionless, and are independent of sample size. Pollution results in depression in diversity, $\bar{d}$, in the biotic community. Values less than 1 have been obtained in areas of heavy pollution, values from 1 to 3 in areas of moderate pollution, and values exceeding 3 in clean water areas.

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TABLE 1

Community structure of three hypothetical communities

Community	n_1	n_2	n_3	n_4	n_5	n	s
A	20	20	20	20	20	100	5
B	40	30	15	10	5	100	5
C	96	1	1	1	1	100	5

TABLE 2

Diversity values obtained with the index $\bar{d} = -\Sigma\ (n_i/n)\ \log_2\ (n_i/n)$ by pooling successive samples from one through ten

		No. of samples pooled									
Habitat	Organisms	1	2	3	4	5	6	7	8	9	10
Meadow	Insects	2.37	3.61	3.98	4.02	4.07	4.08	4.16	4.16	4.17	4.16
Stream	Ben. Mac.	2.34	2.98	3.10	3.15	3.16	3.20	3.27	3.30	3.28	3.28
Spring	Ben. Mac.	1.34	1.39	1.40	1.37	1.35	1.38	1.36	1.37	1.38	1.40
Sample Board	--	2.18	2.21	2.35	2.63	2.77	2.80	2.87	2.85	2.89	2.86

TABLE 3

Examples of species diversity, $\bar{d}$, in polluted waters

Area	Pollutants	$\bar{d}$			
		Above outfall	Near outfall	Downstream	
Skeleton Creek (17)	Domestic, oil refinery	*	0.84	1.59	3.44
Skeleton Creek	Domestic, oil refinery	3.75	0.94	2.43	3.80
Otter Creek (18)	Oil field brines	3.36	1.58		3.84
Refinery Ponds (19)	Oil refinery	*	0.98	2.79	3.17
Keystone Reservoir (20)	Dissolved Solids		0.55		3.01
Alamitos Bay (21)	Oil field brines	*	1.49	2.50	*
Alamitos Bay	Oil field brines	*	1.44	2.70	*
Alamitos Bay	Storm sewer	*	1.45	2.81	*

*data not available

FIGURES

Fig. 1. Interrelationships between abiotic and biotic components of the ecosystem.

Fig. 2. Complex of individuals (n_i) belonging to the different species (s_i) in the ecosyetem.

Fig. 3. Frequency of occurrence of 60 species of mites in 215 samples of pine litter in three pine forests in Tennessee (3).

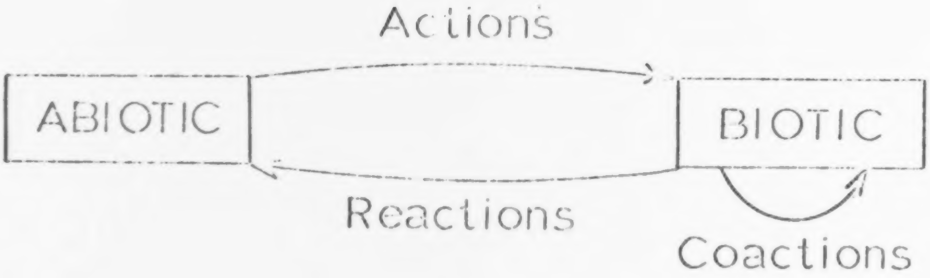
Fig. 4. Differences in diversity of benthic macroinvertebrates in a constant temperature spring obtained with basic data as numbers of individuals and as biomass units.

Fig. 5. Diversity indices of three hypothetical communities (A, B, and C).

Fig. 6. Relative contribution by the N_i to total diversity, $(N_i/N) \log_2 (N_i/N)$, when $N = 100$.

Fig. 7. Longitudinal variation in $\bar{d}$ of benthic macroinvertebrates in Skeleton Creek during fall and spring.

Fig. 8. Duncan's multiple range test applied to mean annual, fall, and spring $\bar{d}$ in Skeleton Creek. Any two means not underscored by the same line are significantly different. Any two means underscored by the same line are not significantly different.


Actions
ABIOTIC
BIOTIC
Reactions
Coactions

species	standing crop
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s_2	n_2
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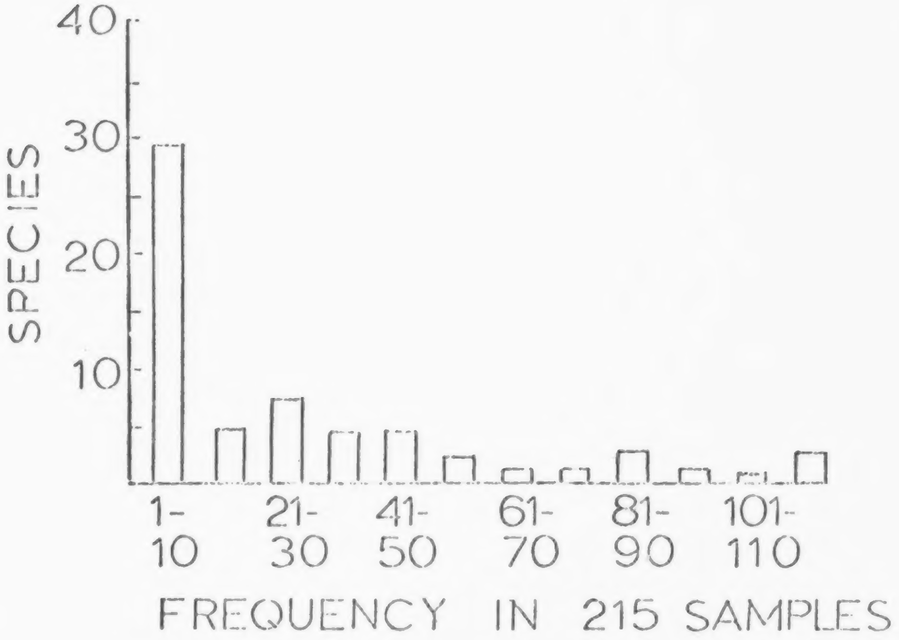
SPECIES
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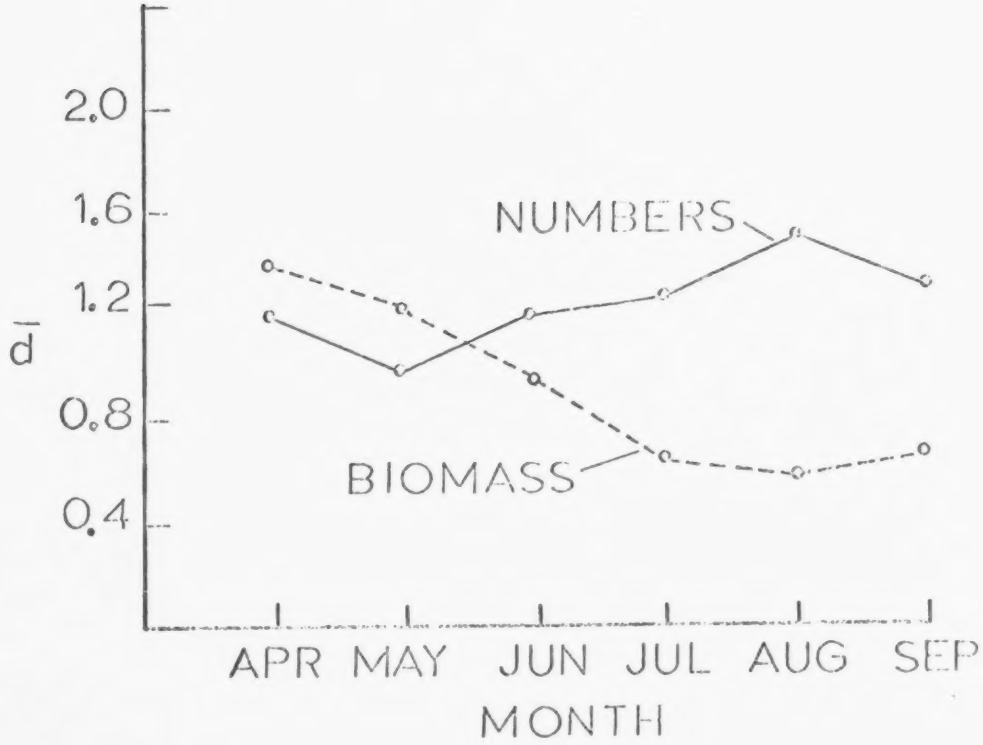
FREQUENCY IN 215 SAMPLES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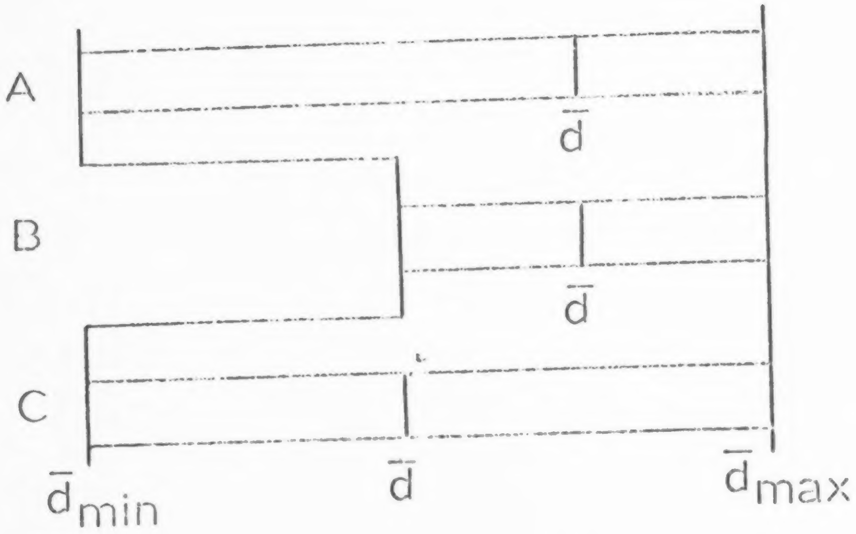
A
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B
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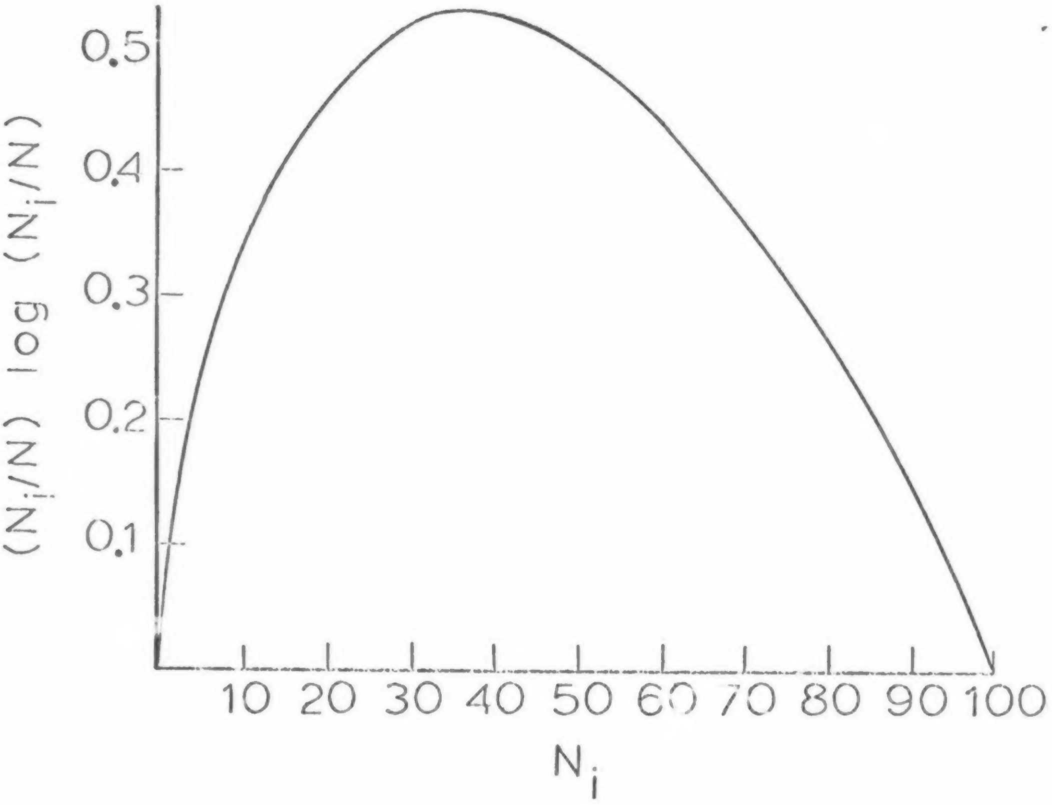
C
$\bar{d}_{min}$
$\bar{d}$
$\bar{d}_{max}$


0.5
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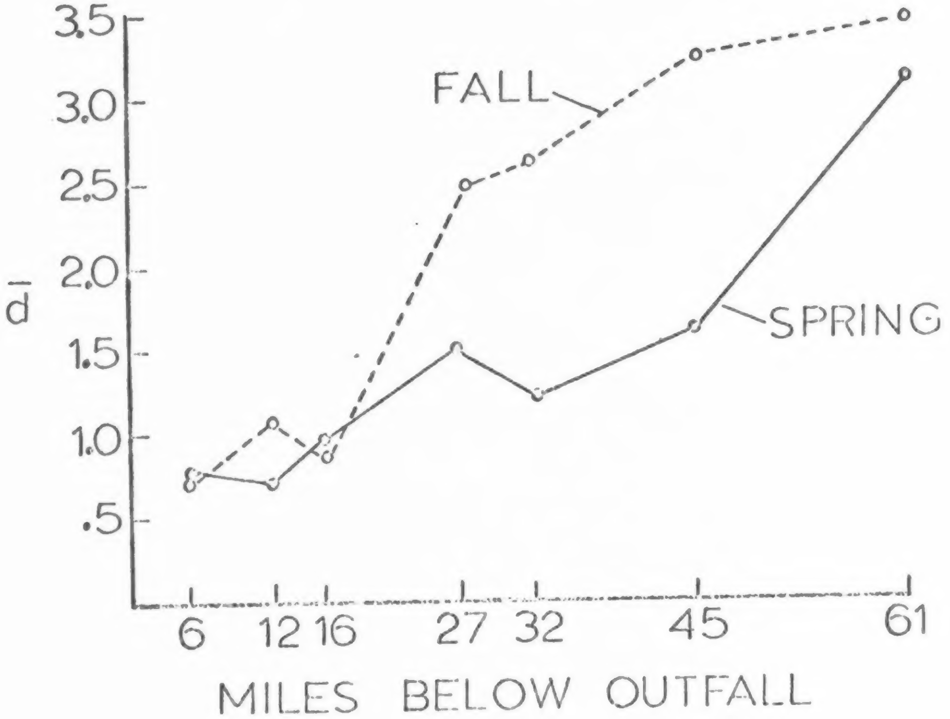
$(N_i/N)\ \log\ (N_i/N)$
10 20 30 40 50 60 70 80 90 100
N_i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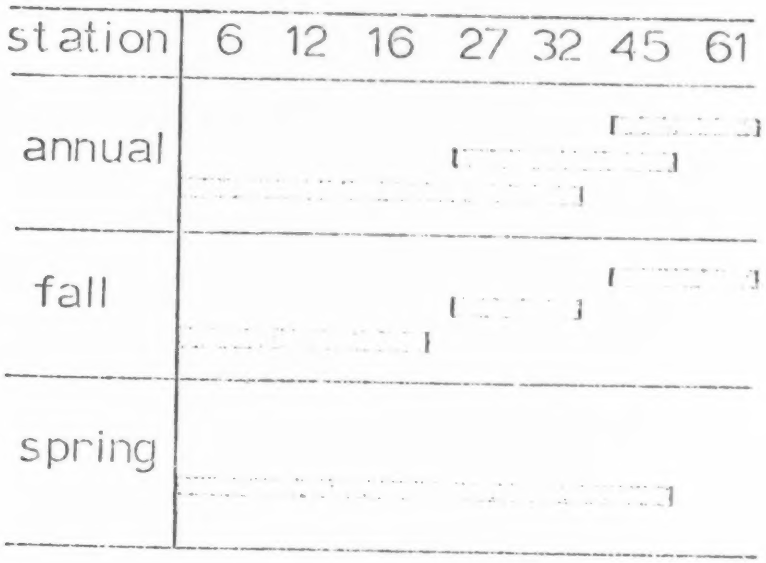
MILES BELOW OUTFALL


station
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61
annual
fall
spring

FOOTNOTES

1. Presented at the symposium on Water Quality Requirements of Aquatic Organisms, AIBS, Texas A & M University, College Station, 1 September 1967.
2. Contribution No. 449. Zoology Department, Oklahoma State University, Stillwater.
3. Dr. Wilhm is Assistant Professor of Zoology at Oklahoma State University. Dr. Dorris is Professor of Zoology and Director of the Reservoir Research Center at Oklahoma State University.

AQUATIC ECOLOGY NEWSLETTER

Vol 2(1) 1 January, 1968

from

Aquatic Ecology Section
Ecological Society of America

Dear Colleague:

This issue of the Newsletter is directed, among other things, toward increasing our network of communicants and incidentally, towards increasing membership in the Section and in ESA. We are sending copies of the Newsletter to a great many names who just might be interested. Please note the infomation request on the last sheet. If you want to continue receiving the Newsletter, supply as much of the information as you can get clearance for and return to the Editor.

We are greatly indebted to the Aquatic Microbiology Newsletter, and its editor Dr. Samuel P. Meyers, Institute of Marine Sciences, University of Miami, Florida 33149, for his freely offered assistance in making our Newsletter effective. Either Dr. Meyers is sitting at the crossroads of some major information sources, or he has developed an efficient spy system. He supplies his readers with many choice bits of information.

This Newsletter could be very helpful to graduating students if we could publish notices of job openings.

Should this Newsletter have a fancy name?

Best wishes for a Happy New Year.

Troy C. Dorris, Editor
Reservoir Research Center
Research Foundation
Oklahoma State University
Stillwater, Oklahoma 74074
405 FR-2-6211 X 6032

ANNUAL MEETING OF THE AQUATIC ECOLOGY SECTION

Ecological Society of America AIBS. Texas A&M. University, 1 Sept. 67.

The annual meeting and luncheon of the Section was attended by 48 members. The next annual business meeting of the section will be held in conjunction with the joint discipline meeting at Madison, Wisconsin 20-24 June, 1968. Deadline for receipt of titles for the Madison meeting is 1 March, 1968. Send titles and abstracts to the ESA program chairman Carl Monk, Institute of Ecology, University of Georgia, Athens Ga

Paper sessions, but no business meeting, will be held at the AIBS meeting at Ohio State University, Columbus, 3-7 September. 1968. Deadline for titles and abstracts is 1 April, 1968

Frieda Taub was elected chairman of the Section Weldon Larimore was elected vice-chairman, in effect, as chairman elect, to serve as chairman. 1968-69 B J Copeland was elected to a 3-year term as Section program chairman, a new position. Troy C. Dorris was elected secretary. Curriculum vitae of the officers are presented below

Aquatic Ecology Section Officers, 1967-68.

Frieda Taub, Chairwoman
College of Fisheries. University of Washington, Seattle, Washington 98105

Current research: Biological models of freshwater communities, i.e., the construction of laboratory ecosystems from known species of algae, bacteria, protozoa, etc These have been termed "gnotobiotic (known bios) ecosystems."

The studies on the effects of high and low protein algae on Daphnia have been completed and several papers are in the process of being published. Copies of the final NIH report can be made available to anyone needing the information immediately Stocks of several species of cladocerans are still available from our laboratory

Current teaching: "Space Biology: Sealed Life Support Systems." The course covers the physical-chemical and biological modes of maintaining a stable environment for man in an isolated body (i. e. a space vehicle, or the earth).

Information wanted: Algal consumers which can be grown "gnotobiotically", i.e., bacteria-free or with known bacteria, etc.

The College of Fisheries has a large and diverse program in aquatic ecology which will be reported here from time to time. The current activities are reviewed in the annual report "Research in Fisheries", College of Fisheries, Contribution No 240. which is available from the Fisheries Oceanography library of our College

Weldon R Larimare Vice Chairman
Illinois Natural History Survey, Natural Resources Building. Urbana, Illinois 61801

Although my graduate studies involved the gametogenesis and gross anatomy of Polyodon and an ecological life history of the warmouth, a pond species. I have generally been concerned with the ecology of warmwater streams From 1950 to 1963. I studied the seasonal dynamics of fish and benthic populations in several small streams. After spending a year with the United Nations in Thailand, during which time I was able to look back and evaluate my past research. I returned to place my attention with larger streams. On one typical midwestern river. I have followed the fish populatio, benthos, drifting organisms, and water chemistry for several years and related these studies to mainstem impoundments and floodplain pools. More and more of my attention is being centered on the exchange of nutrients, fish, and fish food materials between floodplain pools and the associated river and reservoirs

B. J. Copeland, Program Chairman
University of Texas Marine Science Institute, Port Aransas, Texas 78373

My research program involves the effects of rivers on the metabolism of Texas bays (supported by FWPCA). We are using the ecosystem analysis approach to determine the contribution of river water and its contents to the ecology of estuarine ecosystems. In addition to the basic problem of river contributions and their importance to the estuarine ecosystem, we are studying the effects of stresses such as pollution, hypersalinity and temperature on the metabolism of estuarine ecosystems (NSF support for hypersalinity studies). In addition to studies in the natural setting (Texas and Mexican bays), we are utilizing concrete ponds to simulat estuarine systems under more controlled conditions. Individual projects in which my graduate students are involved include: 1) the effects of river water and its quality and quantity on the zooplankton dynamics in an estuarine system; 2) transport of vitamin B_{12} via rivers to estuarine systems; 3) carbon budget and organic cycling in river and receiving estuarine systems; 4) development of gas chromatographic techniques for computing primary productivity from direct measurements of oorganic carbon; and 5) ion imbalances in polluted rivers and their effects on the metabolism of the receiving estuary ecosystem.

Troy C. Dorris, Secretary
Reservoir Research Center, Research Foundation, Oklahoma State University, Stillwater, Oklahoma 74074

Research in Oklahoma largely has been on the ecological effects of oil refinery effluents particularly primary productivity and community structure. Attempts have been made to analyze community metabolism and energy flow in series of effluent holding ponds. The preliminary work did little more than give a "feeling" for the problem, and a new attack is just starting. Community metabolism and structure have been studied in a stream receiving refinery and sewage effluents, and also in several more-or-less unpolluted streams. More recently, interest has been shifted to Keystone Reservoir, where primary productivity and community respiration, and community structure of plankton, bottom fauna, and fishes are under study.

Chairwoman's statement

Never before has aquatic biology been so intensively researched as now. Much of this work, while not labeled as AQUATIC ECOLOGY, is nevertheless well within the subject area, and provides an "informationinput" of overwhelming magnitude. At the same time, there is more opportunity for our research results to be applied, both on the local and national level, to the solution of acute problems.

The benefits of the newly achieved recognition of ecology will not be completely automatic. There is a tendency for the term ECOLOGY to be equated with BIG, BROAD, OVERALL APPROACH and to be used indiscriminately as a new status word. Other disciplines, which have much to contribute to the research and development of methods of aquatic resource management, may completely take over the term and the field if ecologists do not make active and practical contributions this has occurred in at least one field, space biology, where ecologists have had an extremely minor role in the development of "closed ecological systems" while biologists and engineers in more discretely specialized fields have made the major contributions

In aquatic research, ecologists should actively coordinate with other specialties and effectively present ecological findings In theory, we should be ideally equipped to understand the interrelationships of studies in different specialties, to relate laboratory and field results, and to describe and measure the higher levels of community organization If we cannot serve this function, we must seriously question the state of our science

As a section of the Ecological Society of America, we must endeavor to increase communication among aquatic ecologists, increase communication among ourselves and the diverse communities of related fields of science, and to present the current national organizational structure in which aquatic management is being conducted These aims can best be pursued through this Newsletter For realization of the first objective, we need newsnotes from all aquatic ecologists, briefly stating their current programs and projects, and offers or requests for materials or information The membership and officers should actively seek and present notices and excerpts from related fields which might otherwise escape our membership In future issues of the Newsletter, it is hoped we can present the current structures of agencies which are involved with aquatic ecology

To effectively increase communication, the circulation of the Newsletter should be as wide as possible. Membership in the ESA is not a requirement for receiving the AQUATIC ECOLOGY NEWSLETTER Please urge anyone with an interest in the field to write to the editor for inclusion on the mailing list.

IBP INTERNATIONAL BIOLOGY PROGRAM

First Annual Report on the Analysis of Ecosystems, an integrated research program of the US - IBP, was issued [illegible] November, 1967, by Frederick E Smith, IBP Program Director, School of Natural Resources, University of Michigan, Ann Arbor, Michigan 48104 Tel: 1 313 764 4489

Three working sessions have taken place The general design of this program comprises the program statement of the US - IBP Subcommittees on Productivity of Freshwater and Terrestrial Communities NSF has granted support for two years to pay the salary of Program Coordinator John A Kadlec and for secretarial assistance. Originally, six single-site biome studies were planned, with "Contributory" studies by investigators at other sites Each biome program is now viewed as 2-part: (a) an intensive study at one site and (b) a comprehensive study combining work of many sites "Each will be highly organized through centralized leadership and close liaison among project directors" The program, when fully developed, will have a Program Director and Program Coordinator, and in each of six biomes a Biome Director, an Intensive Study Director, and a Comprehensive Study Director (underlines by Ed)

The grasslands biome program was chosen for first development, to provide guidelines for development of other programs. George M Van Dyne, Botany Dept., Colorado State University, Fort Collins, Colorado, is Grasslands Biome Director, and Director of the Intensive Study Members of the IBP Task Force and interested scientists from Colorado (18) [illegible] other states ([illegible]) met at Fort Collins 5-8 October 1967 in a working session A report on Design of Research for the Intensive Study and Plans for the Comprehensive Study was issued 30 November, 1967 A site in northeastern Colorado was chosen as the Intensive Study site

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The general structure of the entire program is to be established by June, 1968. Each biome should have its first working session by the end of January. Biomes include Arctic Tundra, Grasslands, Semi-arid Desert, Eastern Deciduous Forest, Western Coniferous Forest, Tropical Rain Forest. Meetings of Eastern Deciduous Biome Investigators were held in connection with AAAS in New York and at Brookhaven Natioal Laboratory the last week of December. Presumably, areal representation for this biome was much better than for the grasslands session, which was dominated by attendants from a rather restricted locale.

Obviously, the IBP biome programs may well offer opportunities for the development of new local or regional "centers of excellence" Quite evidently, also, IBP is going to raise problems for investigators seeking project support independently. From page 4 of the Annual Report, future events may cast their shadows before... .

> "Several major proposals for ecosystem research have been submitted to granting agencies this year. One of these, just submitted, raises an urgent issue in the Tropical Rainforest Biome, since the site and the proposed research may coincide with IBP plans for the Intensive Study. By February, our decisisons on site, director, and overall research design must have been made, so that our relation to this exising proposal can be clarified. Four other proposals seem more likely to fit into the Comprehensive programs of their biomes, although here also a rapid definition of the IBP studies will help everyone."

Are we faced with the specter of IBP being interposed as another reviewing agency between the investigator and the granting agency? The implication seems to exist that IBP can kill the independent Tropical Rainforest research proposal if it so chooses.

The battle which has been shaping up between university administrators who seek block-type, institutional grants, administered and controlled (in-house review) at the local level; versus investigators who seek individual project support (peer review) administered and controlled largely by the granting agency, has taken a new turn. Now the research profession is seeking institutional-type support. This approach may well combine the best parts of each, but it needs to be recognized for what it is. Hopefully, individual initiative will not suffer. This may be only a pious hope. If the guiding lights of IBP show no more insight in handling this problem than they demonstrated in organizing the grasslands biome, we are in for trouble.

Following is a statement of the functions of the Biome Director, as envisioned in the Grasslands Design.

A. Director Functions

The functions performed by the Grasslands Biome Director include:

1. Provide overall program direction
2. Coordinate both on and off site research
3. Act as chairman of the Grassland Committee
4. Maintain fiscal responsibility for the entire research program
5. Direct program planning and analysis
6. Direct information, laboratory and computational services

7. Direct assignment of shared personnel and use of shared facilities and equipment
8. Maintain coordination with
    a. U.S.A. biome research performed under the ecosystem research program
    b. International grasslands research program
9. Assume overall responsibility for, and coordination of, education and training within the grassland research program
10. Assume responsibility for the preparation and publication of appropriate reports and software generated by the research program
11. Prepare and coordinate the proposal for intensive site research
12. Assist in the coordination and, when appropriate, preparation of proposals for comprehensive (off-site) research

One of Debbie Reynolds' lines comes to mind...."They have got to be kidding!"

INTERDISCIPLINARY MEETING

Ecological Society of America American Socity of Limnology and Oceanograph American Society of Parasitologists, Society for the Study of Evolution, Wildlife Disease Association, and Conference of Midwest Parasitologists will meet together 16-20 June, at the University of Wisconsin. Theme of the meeting is "Ecosystems: Evolution and Revolution". This meeting is sponsored by AIBS.

Monday morning, 17 June, will begin, a symposium on The Process of Ecological Change. Tuesday morning there will be a symposium on Man and Nature

Check the Bulletin of ESA for further details.

B. J. Copeland, Section program chairman, is setting up a session of invited papers on chemical and mathematical techniques for aquatic ecology, probably cosponsored with ASLO. If you wish to participate, or if you have any suggestions, please get in touch with B. J. right away. It is hoped there will be two half-day sessions.

ISRAEL LIMNOLOGICAL CONGRESS

Gerry Gunning, Biology Department, Tulane University, New Orleans, La. 70118 is Chairman of the Aquatic Ecology Section Travel Committee for the International Limnological Congress in Israel, 12-19 August, 1968. Gerry and Geo. Lauff, for the American Society of Limnology and Oceanography, have submitted joint proposals to National Science Foundation for travel support. Final disposition of the proposal is uncertain at this time. If you are interested in receiving a travel grant, write directly to Gerry in the near future. If the grant comes through having your name on file will help expedite matters. Not all of the available money was used for the Congress in Poland.

FROM THE FIELD

Lamarr B. Trott, Lecturer in Zoology, Chung Chi College, The Chinese University of Hongkong, Ma Liu Shui, N.T., Hong Kong, is conducting a marine ecological study of the Hong Kong area, and would be happy to send marine specimens from the area, in return for indentification. Ecologists passing through the area are welcome to visit.

* * * * *

* * * * *

Crawford G. Jackson, Jr. is director of the new Big Creek Lake Biological Station, University of South Alabama. The first permanent laboratory building was scheduled for completion this past summer.

* * * * *

Dr. Milan Straskroba, Hydrobiological Laboratory, Czeckoslovac Academy of Sciences, Vetavska 17, Prague 5, Czeckoslovakia, is secretary of a new Czechoslovak Limnological Society.

* * * * *

Robert J. Beyers is director of the Savannah River Ecology Laboratory, Box A, Aiken, South Carolina 29801. Dr. Beyers has recently compiled a bibliography on measurement of aquatic primary productivity. This is multilithed, 52 pages.

Undergraduate science majors are eligible for appointment as Research Apprentices at the Savannah River Ecology Laboratory, 1 June to 30 September, 1968, to participate in research. Monthly stipends are $350. Applications are due before 1 March, 1968.

* * * * *

E. Bennette Henson is Director of the Lake Champlain Studies Center at University of Vermont, Burlington. The Center was approved 26 February, 1966. The staff includes: Phillip Cook, Botanist; Kenneth Fisher, Botanist; Allan Hunt, Zoologist; Donald Johnstone, Microbiologists; Milton Potash, Zoologist. The "Melosira", a 47 ft, steel-hulled, dieselpowered research vessel, was launched 1 August, 1966. The Center sponsors a series of Research Conferences on Lake Champlain. A Bulletin is published which gives details on the extensive program of research studies.

* * * * *

PERIODICAL PUBLICATIONS

SEAHORSE. News of Oceanography and Limnology published by Hydro Products division of Dillingham Corporation, P. O. Box 2528, San Diego, Calif. 92112. Reports on commercial developments in instrumentation and equipment.

* * * * *

OCEANOLOGY International - News of Ocean Science and Technology. Published 7 times a year by Industrial Research Publications Co., subsidiary of Industrial Research Inc., Beverly Shores, Indiana 46301. You may be eligible to receive this new journal gratis. Good coverage of current oceanographic news, lead articles on timely topics.

* * * * *

HYDROBIOLOGY Newsletter. Published by The George Washington University - Biological Sciences Communication Project, 2000 P St., N.W. Suite 700, Washington, D. C. Multilithed.

SFI Bulletin, published by Sport Fishing Institute, 719 13th Street, Washington, D. C. 20005 Free distribution. News notes of interest to fishery biologists and other aquatic ecologists.

MULTIDISCIPLINE-MULTIAGENCY STUDY ON PUGET SOUND, WASHINGTON

In 1965, the Fisheries Research Institute and the Department of Oceanography, University of Washington, with the cooperation of the Washington State Department of Fisheries (WDF), Municipality of Metropolitan Seattle (METRO), and U. S. Geological Survey (USGS), initiated studies to evaluate water quality and determine the timing of migration, distribution, and mortality of stocks of economically important fishes in the Elliott Bay-Duwamish River estuary. In this cooperative endeavor the Fisheries Research Institute, the Department of Oceanography, and METRO are conducting biological and hydrographic work; METRO and the USGS are measuring the chemical and physical parameters of the estuary through a series of automatic water-quality monitors; and the WDF is supplying data on the abundance of adult and immature salmon as well as records of production of the Green River State Salmon Hatchery.

Other agencies assisting in fulfillment of project objectives include the Washington Pollution Control Commission (WPCC) and the U. S. Army Corps of Engineers. The WPCC, the State agency responsible for pollution abatement, has contributed considerable data from studies conducted in Everett and Elliott Bay. The Corps of Engineers assisted the 1967 downstream immature chinook salmon mortality study by controlling discharges from a flood control dam in the upper Green River watershed. WDF hatchery releases of chinook fingerlings were made under markedly different streamflows so the effect of discharge and turbidity on downstream and estuarine salmon mortality could be assessed.

Further information can be obtained from Dr. Ernest O. Salo, Associate Professor, College of Fisheries, University of Washington, Seattle, 98105.

RECENT PUBLICATIONS ON OCEANOGRAPHY

Oceanography 1966: Achievements and Opportunities
(NAS-NRS publ. 1492, 1967, 183 p, paper, $5.00.)
Economic Benefits from Oceanographic Research
(NAS-NRS publ. 1228, 1964, 50p. paper, $2.00)
Symposium of aspects of deep sea research
(NAS-NRS publ. 473, 1957, 181 p, paper, $1.75)
Oceanography Information Sources (NAS-NRC publ. 1417, 1967, 38 p, paper, $1.50)
International Directory of Oceanographers, 4th edition
(1964, 273 p, paper, $2.00)

These can be ordered from:

National Academy of Sciences
Printing & Publishing Office
2101 Constitution Avenue
Washington, D. C. 20418

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NATIONAL ESTUARINE POLLUTION STUDY

The Ecological Society, along with other national and regional organizations, has been invited to assist the Federal Water Pollution Control Administration in preparing a report on estuarine pollution.

The Public Affairs Committee of ESA met with the Office of Estuarine Studies of FWPCA the week of 27 October, 1967. The Office is interested in case studies (not research) on ten important estuaries. OES is interested in receiving suggestions from individuals who are willing to contract to work on such case studies, as well as recommendations for particular and representative estuaries that would be suitable for such case studies. More importantly, suggestions on how to go about such a study are wanted. In addition, ideas or information on a management system are needed. There are funds to support the case studies.

So now the problem becomes one for individual action. If you are interested, the man to contact is

Eugene T. Jensen, Chief, Office of Estuarine Studies
Division of Technical Services, FWPCA
U. S. Dept. of Interior, Washington, D. C. 20242
Telephone: 963-35872

A brochure can be obtained from FWPCA which outlines the program in detail. Here is a statement of the scope and objectives, taken from the brochure:

OBJECTIVES:

To prepare a report for the Secretary of the Interior to the Congress which will: (1) document and analyze the various aspects of estuarine pollution; (2) make recommendations for a comprehensive National program for preservation, study, use, and development of the estuaries; and (3) recognize the respective roles of Federal, State, and local governments plus public and private interests.

SCOPE:

The Act calls for a comprehensive study of the effects of pollution, including sedimentation, in the estuaries and estuarine zones on beneficial uses and a consideration of use-trends which will influence future pollution problems. The Act also calls for the assembly, coordination, and organization of all existing data; the conduct of surveys to provide supplementary data in representative estuaries, the identification of problems and areas in need of further study, and analysis of economic and social values of the estuaries; and a discussion of the major economic, social, and ecological trends as they may influence future pollution problems. The Act directs that the study be made in cooperation with other government agencies, private organizations, institutions and individuals.

Apparently, regional hearings are to be conducted. I have been asked, as Secretary of the Section, to appear at a hearing at Biloxi, Mississippi, 17 January, 1968. I am not the best qualified person for this task, and hope others in the area will volunteer. John R. Thoman, Regional Director, Southeast Region FWPCA Suite 300 1421 Peachtree Street, N.E., Atlanta, Georgia 30309

In other regions, I suggest that you communicate immediately with regional offices of FWPCA to offer your services.

OTHER MEETINGS

The Midwestern Benthological Society will hold its annual meeting in the Wisconsin Center Building, University of Wisconsin, 17-19 April, 1968. Clarence J. Goodnight, Dept. of Biology, Western Michigan University, Kalamazoo, is Secretary. The Literature Review Committee has prepared a Bibliography of Benthic Macroinvertebrates which can be obtained for the Secretary.

A Latin American Limnological Conference is scheduled 8 March, 1968, at the Laboratorio de Hidrobiologio, Direccion General de Recursos Naturales, Casillo Correo No. 58, Boulevard 3100, Santa Fe, Argentina. Dr. Argentino Aurelio Bonetto is Director. This conference is a part of the developing Argentina IBP program.

CALORIFIC EQUIVALENTS FOR STUDIES IN ECOLOGICAL ENERGETICS.

This is the title of a 52 page compilation issued October, 1967, by Kenneth W. Cummins, Pymatuning Laboratory of Ecology, University of Pittsburg, Pittsburg, Penna. 15212

SUMMER ECOLOGY INSTITUTES

The ESA Bulletin calls attention to the need for bringing college biology teacher up to date in ecology and the possibility of obtaining NSF support for summer institutes and short courses. If interested in conducting such a course write to Paul Pearson, Dept. of Biology, Rutgers, New Jersey 08903.

AQUATIC ECOLOGY AT RUTGERS

Personnel Changes:

Dr. Paul G. Pearson has assumed the Chairmanship of the Zoology Department.

Dr. Herbert Hidu is now a Research Associate with the Chesapeake Bay Laboratories, Solomon Islands, M.D.

Douglas Woodring will be an Assistant Professor in Limnology at the University of Michigan starting January, 1968.

Dr. Wester Van Winkle has accepted a position as Assistant Professor in Biology at William and Mary College in Virginia.

Available Support and New Facilities:

Rutgers enjoys a NSF Ecology Training Grant which supports eleven students in both terrestrial and aquatic ecology. This grant affords both freedom and responsibility for the individual to design his own research program. Other support for ecology students includes teaching assistantships and fellowships from NASA, NDEA and NIH.

Dr. Harold Haskin is in the final stages of establishing a fourth New Jersey Shellfish Research Laboratory on Sandy Hook, N.J.

Some Current Degree Programs:

Robert K. Edgar is working on a project designed to determine the effect of mineral eutrophication on a stream diatom community structure.

Peter A. Gail is studying the effects of water level fluctuation on shoreline colonization by aquatic plants in a pump storage reservoir.

Dr. Herbert Hidu has completed a dissertation on the factors affecting inshore oyster setting at our Cape May laboratory.

Edward J. LaRow is investigating endogenous migration rhythms in *Chaoborus* larva using a systems controlled artificial lake.

Gloria T. Mackie is attempting to work out the energy budget of oysters feeding on their primary food sources.

Bruce A. Manny is establishing a method for estimating the phyto-organic nitrogen component of seston samples.

Kent Mountford is copiling a "Before" picture of seasonal and spatial distribution of phyto and zooplankton in Barnegat Bay prior to operation of a nuclear power plant under construction there.

Frank X. Phyllips is determining the effects of sediment size and temperature on benthic animal distribution in Barnegat Bay.

Dennis F. Rio is characterizing the abundance, density and frequency of occurance of planktonic microcrustacean populations in a filling reservoir.

Jon Taylor is clarifying the relationship between the distribution of macroscopic estuarine algae and present conditions of light temperature and salinity in Barnegat Bay.

Dr. Webster Van Winkle completed his dissertation on the effects of temperature and salinity on the ciliary feeding rate of the American Oyster, *Crassostrea virginica*.

Douglas Woodring is studying the diurnal rhythms in photosynthetic capacity and related physiological processes in steady state cultures of freshwater phytoplankton.

SOME GOINGS ON IN FWPCA

James M. Quigley, Federal Water Pollution Control Commissioner, has resigned to take position in industry. He will be succeeded by Joe G. Moore, executive director of the Texas Water Development Board. Frank C. Di Luzio, Assistant Secretary for Water Pollution Control has also resigned to take a job in industry. Apparently, De Luzio has been disturbed by charges that FWPCA has been approving state water quality criteria that essintially result in downgrading water quality.

Donald I. Mount has been appointed acting Director of the Water Quality Laboratory at Duluth, Minnesota. This laboratory is located on the shore of Lake Superior, largest body of fresh water in the Western Hemisphere. Dr. Mount, a research fisheries biologist, was formerly Supervisor of the Fish Toxicology Laboratory, Newtown, Ohio, Federal Water Pollution Control Administration.

The new laboratory, a facility of the U.S. Department of the Interior, will deal exclusively with problems of fresh water pollution. It was built for the Federal Water Pollution Control Administration at a cost of approximately $2.2 million and when in full operation will contain more than $1 million worth of highly technical and scientific equipment. Begun in the fall of 1965, the Duluth facility will have a professional, technical, and supporting staff of more than 130 persons. The present staff includes 23 professionals and 9 technical and clerical employees. They are working temporarily at the University of Minnesota Duluth.

Research objectives include: Determining the kinds and amounts of pollutants that affect all organisms in the aquatic food chain, from microscopic plant and animal life to fish, developing means to detect obscure causes of deterioration of the aquatic environment and means for dealing with these problems, and developing more precise biological indicators of pollution and rapid autopsy techniques in order to determine precise causes of fish kills and deaths among other aquatic organisms.

ENVIRONMENTAL POLLUTION: SCIENTISTS GO TO COURT

This is the title of an article carried by Science 22 December about the new Environmental Defense Fund, Inc. and its imaginative efforts to halt indiscriminate pollution by pesticides. Goerge M. Woodwell, chief ecologist at Brookhaven National Laboratory is a trustee of the organization.

JOB NOTICES

Delaware River Basin Commission, P. O. Box 360, Trenton, New Jersey 08603. $10,200-13260. M. S. degree in biological discipline or oceanography, plus 3-years experience or extra graduate work.

* * * * *

Be sure to complete and return the questionnaire which forms the last sheet of this Newsletter.

One additional item - if you are engaged in a multidisciplinary, multiagency ecological study of a habitat please send details. It has been suggested that a catalog of such efforts would be very valuable.

Biloxi Chamber of Commerce
Serving The Biloxi Metropolitan Area
1036 Central Beach West
Telephone 432-0424
Area Code 601

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January 17, 1968

TO: Office of Estauarine Studies

FROM: Biloxi Chamber of Commerce

SUBJECT: NATIONAL ESTUARINE POLLUTION STUDY

The Biloxi Chamber of Commerce would like to present the following statement in support of the Clean Water Restoration Act of 1966 and the proposed study of estuarine pollution.

The entire area of the Mississippi Gulf Coast is an estuarine area of the utmost importance to the economy of the area. Into these waters come many forms of marine life to breed and grow before spreading into the Coastal and Gulf Waters. Clean water is essential to maintaining this condition of marine incubation. Of utmost importance is the breeding of shrimp and oysters. These two seafood crops are the basic economy of the vast seafood canneries and raw-stock dealers which have millions of dollars investment and employ many thousands of workers.

Of equal importance, to our multi-million dollar tourist industry, is the estuarine waters of our Coastland which abound in game fish. A strict balance of nature is essential to maintain the delicate conditions necessary to bring the migratory fishes into our harbors, bays and streams in certain seasons.

Clean water is a matter of existence for the Mississippi Gulf Coast! We must have un-polluted waters in our environs for a growing industrial demand, recreational uses of our waters, and the continuing good health of our entire area.

Our Mississippi Gulf Coast is fortunate to have many rivers and bayous emptying into bays and the Mississippi Sound and thence into the Gulf of Mexico. Much of our waters are navigable and is heavily trafficked by commercial and pleasure craft. These same waters flow over our extensive oyster beds and MUST be clean and unpolluted to feed the oysters. Pollution spells disaster to this industry.

Since the Mississippi Gulf Coast area is heavily populated, homes, businesses, and industries are crowded right down to the water's edge. This creates an immediate problem of wastes dumped into our waters. In addition it is possible that some sanitary waste drains into the waters.

In Harrison County, as also in adjacent counties, a heavy industrial build-up is now being experienced. Never before in the history of this area has such industrial use been effected. We hail these new industries and have confidence that agencies responsible for securing them in our areas will also enforce effective and continuous pollution control measures.

The Biloxi Chamber of Commerce would like to welcome any call for assistance from the Office of Estuarine Studies and will stand ready to appoint a committee to work with the appointed state representative. We do now and always will fully endorse effective measures for the effective control of pollution in our waters.

J. D. D.
J. D. DeLamarre
President

Walter F. Fountain
General Manager

The Quaker Oats Company

MERCHANDISE MART PLAZA
CHICAGO, ILLINOIS 60654

AREA CODE 312
TELEPHONE 527-0600

January 25, 1968

Director, Southeast Region
FWPCA, Department of Interior
Suite 300
1421 Peachtree Street, N.E.
Atlanta, Georgia 30309

The Quaker Oats Company's Statement in regard to the Nationwide Estuarine Study at the Public Meeting in Biloxi, Mississippi on January 17, 1968

The Quaker Oats Company operates a fish processing plant for the manufacture of pet foods on the east side of the Pascagoula River, in the City of Pascagoula, Mississippi. At this point on the river we are less than two miles from the mouth and entry into the Mississippi Sound. We are therefore, in the estuary of the Pascagoula River which is subject to tidal flows from lunar and wind forces.

The Mississippi Air & Water Pollution Control Commission held a public hearing in Jackson, Mississippi on January 16th for a proposed amendment to the Water Quality Criteria for Interstate and Coastal Waters. The amendment prescribes that at least 85% reduction of BOD shall be provided for Municipal and Industrial Wastes, regardless of the actual conditions of the receiving waters. It is understood that this additional restriction (which amounts to the equivalent of secondary treatment for all industrial waste water) is required by the Federal Water Pollution Control Administration for their final approval of State Water Criteria.

It is our opinion that this requirement by the FWPCA of the equivalent of secondary treatment for industrial waste water, regardless of whether the receiving waters are estuarine or inland is unnecessarily restrictive.

We understand that a waste water treatment plant must be able to provide at least 85% reduction of BOD for inland streams. For any industrial waste water treatment plant which uses the esturarine water as a receiving stream we should consider the assimilative capabilities, flow volume, dissolved oxygen content, tidal action and surface reaeration of the stream versus its total pollution load before we can formulate a reasonable effluent standard.

According to Drs. W. Abbott and G. Gunter of Gulf Coast Research Laboratory in their paper presented on January 17, 1968 to the Meeting: "......BOD loading does not look like a menace ...... It would appear therefore that decrease in fresh water influx, with associated decrease in turbidity, probably constitutes a far greater hypereutrophication menace than does inflow of domestic and industrial waste waters". It seems that initial arbitrary standards on BOD levels does not entirely solve a complex problem.

We support the opinion submitted by the Mississippi Manufacturers Association that a Federal grant should be made to study esturarine physical characteristics before a water quality standard can be formulated.

WSC/lk

William S. Chen, P.E.
Senior Engineer
Mechanical Section
Engineering Department

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262

Girl Scouts of the United States of America

REGION V
NATIONAL BRANCH OFFICE
2400 POPLAR AVENUE
MEMPHIS, TENNESSEE 38112
TEL: 324-7145
AREA CODE 901

January 15, 1968

Mr. John R. Thoman, Regional Director
United States Department of the Interior
Federal Water Pollution Control Administration
Broadwater Beach Hotel
Biloxi, Mississippi

Dear Mr. Thoman:

The Girl Scouts are indeed interested in resource management and other conservation problems.

I am including two mimeographed reports on Girl Scouts and conservation. Please note on page 2 of the 1966 Report to Keep America Beautiful, Inc., the water pollution clean-up activities. Another mimeographed piece is Conservation and Girl Scouting 1967. The Report to the Nation: National Youth Conference on Natural Beauty and Conservation, I think you will also like to see.

Sincerely yours,

Mary Elizabeth Thompson
Regional Director

MET/lt

1966 REPORT TO KEEP AMERICA BEAUTIFUL, INC.

GIRL SCOUTS OF THE U. S. A.

Girl Scouts have always helped to protect, improve, restore and enrich the beauty and quality of the environment. This is one way to live up to the Girl Scout Promise.

It is currently impossible to summarize all the conservation and related activities of the three million or so girls aged 7 to 17 and two-thirds-of-a-million adults in Girl Scouting. A few examples must suffice to illustrate the extent of Girl Scout conservation activities in 1966.

Forty Girl Scout Councils have reported anti-litter "promise in action" projects this year:

> Girl Scouts of Tuscaloosa, Alabama, sparked a city clean-up drive partly to make their city beautiful enough for the expected visit of Mrs. Lyndon B. Johnson. They purchased awards for schools with the cleanest land area, prepared and placed anti-litter posters in store fronts, distributed litter bags and encouraged civic groups to put more trash containers in the streets.
>
> The Greater Boston Council of Girl Scouts sponsored an anti-litter poster contest. The contest involved creation of large, original posters with the slogan: "A Cleaner Boston Depends On You." Twenty-four winners were chosen in April.
>
> Philadelphia, Pennsylvania Girl Scouts continue with their clean-up activities along streets and roadways. This has been a popular activity for a number of years. Philadelphia and nearby communities are all the more beautiful because of it.

Thirty-two Girl Scout Councils have reported city beautification "promise in action" projects this year:

> Stimulated in part by Mrs. Lyndon B. Johnson's "Let's Beautify America" article in Reader's Digest magazine, eighteen Junior Girl Scouts of Union Star, Missouri, took it upon themselves to beautify their town. They built flower boxes from donated lumber, planted flowers in them and put the finished products in front of the town's business establishments. With permission from appropriate officials, they planted flowers in and around the main street and entrances of their town and took the responsibility of caring for their plantings.
>
> Girl Scouts of Jackson, Tennessee joined with a local garden club to beautify a new shopping center in their town with flower plantings.
>
> Fullerton, California Cadette Girl Scouts took part in their Community's "cutting day". On this day each April, community members exchange flower and shrub cuttings with each other. This increases the variety of plantings and the town's natural beauty. Girl Scouts also bring cuttings, make cuttings and plant cuttings around the homes of willing elderly persons and invalids.

Senior Girl Scouts of Erlanger and Elsmere in Kentucky are beautifying their towns. They have cleaned up and planted flowers around public buildings and around a new highway built through the towns.

On making our waterways and waterfronts cleaner and more beautiful:

A Brownie troop of the Totem Girl Scout Council of Seattle, Washington spent three weekends cleaning up a large section of beachfront along the Pacific Ocean.

Girls from the Suncoast Girl Scout Council of Tampa, Florida cleaned up debris from a section of beach along the Gulf Coast. They will continue caring for that beachfront since there is no city or county maintenance of it.

The Wau-Bun Girl Scout Council of Fond du lac, Wisconsin, has girls involved in a study of water pollution in Fond du lac County. They are cooperating with the Fond du lac Conservation Alliance in this activity.

Girls of the Philadelphia Girl Scout Council in Pennsylvania, annually help park people to clear the channel of Wisahicken Creek of tree limbs, willows and debris.

Eighty Girl Scout Councils have reported parks and open spaces "promise in action" projects this year:

Girl Scouts of Belton, Missouri, turned a vacant piece of town-owned land into a lovely park. The park was needed and welcomed by Belton's citizens and added much to the natural beauty of the town.

Girl Scouts of San Fernando Valley responded to the urgent need for trees, shrubs and ground cover plantings at the recently completed Los Angeles Children's Zoo. Troops bought plants for the zoo with money from their own treasuries. And over one-hundred troops participated in the widespread planting activity at the zoo.

A Junior Girl Scout troop in Granite Falls, North Carolina, rejuvenated a local park described by one citizen as "drab and uninspired". The girls planned walks through the parks and surrounded them with beds of flowers, Jonquils, azaleas, cannas, sage, petunias and holly shrubs were planted. The Junior Girl Scouts will continue to care for the park which is now described by the town's mayor as "one of the most beautiful landscapes in Granite Falls".

Girl Scouts of Yellowsprings, Ohio, are helping Antioch College maintain their famous nature sanctuary. Trail maintenance, flower and shrub plantings and debris removal are among the sanctuary activities shared by Girl Scouts.

On making our roadsides beautiful:

Girls from the Western Massachusetts Girl Scout Council have two-and-one-half to five-mile hikes on Saturdays along nearby roadways. On these hikes, the girls remove debris and maintain roadside attractiveness.

Girl Scouts of Sacramento, California, continue to plant golden poppies and blue lupine flowers along California roadways. This project has been a regular on-going activity in recent years.

A community eyesore - a main road - was transformed into a beautiful drive by Girl Scouts of Kingsport, Kentucky. The road had formerly been cluttered with neglected shrubbery, weeds and litter. Thanks to the Girl Scouts, this main road is now clean and well-kept. And formerly unattended flower beds at a traffic circle are now cultivated and have bright new flowers.

Girl Scouts of Boise, Idaho, joined with Boy Scouts to re-seed grass on a hill along a new highway. Vegetation on the hillside had been destroyed during road construction and soil erosion problems were serious. Direction was given by the U.S. Forest Service, U.S. Bureau of Land Management and the U. S. Soil Conservation Service.

On conservation education:

Some Harlowton, Montana Girl Scouts are busy showing conservation films to other groups in their community. They have received cooperation from the U. S. Forest Service in their endeavor.

Senior Girl Scouts from the San Fernando Valley Girl Scout Council in Los Angeles are serving as aides at the nearby Placerita Canyon Nature Center. Among other things, these girls are re-writing regular Center guide material for children's use.

Girl Scouts and The New Conservation is a current project theme of the Western Massachusetts Girl Scout Council. The project began with surveys of the conservation and natural beauty needs of local communities. It went on to teach about new developments in natural resources use. Now, action projects are planned. Consultant help is coming from the University of Massachusetts.

Senior Girl Scouts of Denver, Colorado, are cooperating with the U. S. Forest Service in developing a special nature train adapted for use by blind persons.

On taking leadership in community conservation efforts:

Some Seattle, Washington Girl Scouts after surveying their city's Carkeep Park, came up with a plan for the park's development that it presented to the local Park Board. The plan included a two-page list of suggested improvements among which were the construction of a safe walking trail and clearing up of Piper's Creek pollution.

Girl Scouts of Fort Wayne, Indiana, became concerned about the destruction of an important historical section of the downtown area to make way for a highway and urban renewal project. They cooperated with the Fort Wayne-Allen County Historical Society and Museum in making a photographic study of the area to preserve it for posterity on film. The historical area was demolished as planned, but the girl's study kindled new interest among townspeople for protecting historical areas in future redevelopment planning.

Girl Scouts of Grifton, North Carolina, invited others to join them in a long-term project to clean-up their town. Merchants and civic groups donated brooms, rakes, shovels and litter bags for the project. A clean-up "kick-off" parade was attended by most of the townspeople. As the project continues, more groups and individuals are joining in and a new desire to clean buildings and lots is apparent.

Two-hundred Girl Scout Councils reported general conservation "promise in action" projects this year:

The Utah Girl Scout Council has trees for beauty for its current "promise in action" project. They planted 13,000 seedlings of fifteen kinds of conifers in April on selected sites. Cooperation was received from Utah and Nevada State foresters and the U. S. Forest Service. The girls involved signed "promissory notes" to assume care of the trees they plant.

Girls of St. Stanislaus Troop 30, Michigan City, Indiana, spent Girl Scout Week in April building and erecting bird houses for purple martins. The houses will attract martins who, in addition to adding beauty and interest to the community, will be helping to rid 17 neighborhoods of mosquitos.

Twenty-eight Senior Scouts from the Girl Scout Council of Central Maryland recently completed conservation training for Ranger Aides. Instruction was provided by State and Federal conservation agencies. As Ranger Aides these girls will now give at least fifty hours of service assisting in forestry projects. Some will get extra training and become Outdoor Consultants in conservation, sharing their knowledge with other troops in the area.

The National Youth Conference on Natural Beauty and Conservation, June 26-29, 1966, in Washington, D. C., brought 500 teenagers together from all over the United States, Puerto Rico and Canada. They represented ten national youth organizations, including Girl Scouts of the U.S.A., with a combined membership of over twenty million. The Conference was a joint effort by the ten participating youth organizations, but the original idea for the Conference and Conference management, came from Girl Scouts of the U.S.A.

In summary: There is no end to the variety and number of conservation projects that Girl Scouts can and are doing. Only a few examples have been presented in this report.

GIRL SCOUTS OF THE U.S.A.
830 Third Avenue
New York, New York 10022

Program Department
September, 1966

Presidential Documents

Title 3—THE PRESIDENT

Proclamation 3759

YOUTH FOR NATURAL BEAUTY AND CONSERVATION YEAR

By the President of the United States of America

A Proclamation

Last June, young men and women of the National Youth Conference on Natural Beauty and Conservation met in Washington and dedicated themselves:

—to work toward creating a healthful environment in our cities and towns.

—to speak out for the appreciation and protection of the beautiful.

—to clean, to plant, to plan and build for beauty.

—to plead with others to join them in that effort.

They made this pledge because their generation will soon inherit an America that threatens to become physically ugly.

The great industrial progress we have made in this century—resulting in an unparalleled prosperity for most of our people—has not been achieved without waste and blight. That progress grows with each year—and refuse, pollution and decay grow with it.

It is no part of America's dream that we should erect a house of material well-being in the cheerless atmosphere of physical blight. Our people will be denied their heritage if they must live out their lives among polluted rivers, spoiled fields and forests, and streets where nothing pleases the eye.

Young people sense this strongly. They have not grown accustomed to ugliness. They have not resigned themselves to living among the litter and neglect of a careless civilization.

May they never do so.

But it is not enough to be offended by ugliness. Those who would not live without beauty must join in a tireless effort to bring it into being. They must help to reverse the sorry decline of cities and countryside. They must become a force for restoring order and dignity to the environment that surrounds them. I know that ugliness will yield to such a force, if it is supported by millions of our people, in public and private life.

And, THEREFORE, I, LYNDON B. JOHNSON, President of the United States of America, do hereby designate the year 1967 to be Youth for Natural Beauty and Conservation Year; and I ask our young people—individually and through clubs, school groups, and other organizations—to observe, to plan, and to act to preserve and protect, salvage and restore, develop and enhance their surroundings.

I ask the youth organizations which sponsored the National Youth Conference—and all other organizations and individuals working with youth—to expand the natural beauty and conservation activities now under way, and to begin new activities. I expect them to report their accomplishments to me during the year and also their plans for the future.

I call upon the President's Council on Recreation and Natural Beauty, the Citizen's Advisory Committee on Recreation and Natural Beauty, and all Federal officials and agencies to cooperate, consistent with their authorities and available funds, in providing technical assistance and support to the young people. It is an investment in better environment, and in better citizenship.

I further call upon all citizens to be alert to the activities and hopes of our young people, to hear their requests, to encourage and assist them, and with them to grow more aware of the beauty of America and the ways in which we can preserve it.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Seal of the United States of America to be affixed.

DONE at the City of Washington this 28th day of December in the year of our Lord nineteen hundred and sixty-six, and of the Independence of the United States of America the one hundred and ninety-first.

Lyndon B. Johnson

By the President:

Dean Rusk

Secretary of State.

[F.R. Doc. 67-124; Filed, Jan. 3, 1967; 2:05 p.m.]

CONSERVATION AND GIRL SCOUTING
1967

Girl Scouts of the U.S.A. is the largest voluntary non-sectarian organization for girls in the free world. Current membership is almost 3 3/4 million (about 3 million girls ages 7 to 17 and 600,000 adults, more than 50,000 of whom are men).

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Conservation activity suggestions for girls are included in the Handbook for each of the four age levels. The Girl Scout Leader Notebook gives additional guidance to adults on such activities. Girl Scout Leader magazine, published monthly from October to June and sent to all adults in Girl Scouting and American Girl magazine, a monthly magazine for girls in general (with about one million subscribers currently), carry articles on outdoor and conservation subjects.

Other material on these subjects is regularly sent to Girl Scout councils and professional workers. Certain publications on conservation are available for sale from the equipment service. Appropriate audio-visual aids are also available for sale or rental.

Adults in Girl Scouting receive direct training in conservation, often with the cooperation of conservation consultants from government agencies, agricultural and industrial groups, naturalist and garden clubs, civic groups and universities.

Emphasis on conservation activities for Brownie Girl Scouts is on creation of awareness of the environment and the encouragement of doing simple things to protect and improve the environment, e.g. stress on good outdoor manners and their importance. For Junior Girl Scouts, awareness of the environment is extended and service in conservation is encouraged by doing outdoor good turns. Junior Girl Scouts can also earn proficiency badges of various kinds that have conservation requirements.

For Cadette Girl Scouts, emphasis is on more sophisticated conservation activities and a proficiency badge in conservation itself is offered along with other badges that have conservation requirements. For Senior Girl Scouts, there are in-depth conservation activities and conservation training as Ranger Aides.

CONSERVATION AND GIRL SCOUTING
1967

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It is impossible to summarize all the conservation activities of so large an organization as Girl Scouts. Only eleven examples will be used in this short report to illustrate the scope and extent of Girl Scout conservation activities in 1967.

Susan Wheeler, a Girl Scout of Franklin Square, New York, is using a $500 grant from the Coca-Cola Company for expansion of the conservation education program of the TrailBlazer Camps serving disadvantaged youths from the New York area.

Connie Steward, a Girl Scout of Washington, D.C., extended her Junior High School Garden Club's beautification activity by getting students to distribute seeds and flower boxes to apartment dwellers in the surrounding community.

Scouts of Middlesex County Girl Scout Council are developing an educational nature trail at Colonial Park in East Millstone, New Jersey.

Girl Scouts of Birmingham, Alabama, are busy developing a local school nature trail and bird sanctuary.

Senior Girl Scouts of the Tropical Florida Girl Scout Council have initiated an educational project to arouse more interest in Everglades National Park and its problems.

The Fox Valley Girl Scout Council of Illinois had accepted the responsibility for maintenance and improvement of six-tenths of a mile of the Illinois Prairie Path as a natural area for twelve years. They will provide rest stations, picnic tables, trail markers and bird houses and encourage public use of the path for hiking and nature study.

Albuquerque, New Mexico Girl Scouts are collecting and distributing wild flower seeds to various groups to plant along roadsides in their community.

All troops in the Minn-Ia-Kota Girl Scout Council of Sioux Falls, South Dakota planned conservation activities for Girl Scout Week in March as part of "project conservation - Big Push".

Los Angeles, California Girl Scouts have been assisting in the preparation of exhibits and written materials at the Placerita Canyon Nature Center.

Scouts of the Pisgah Girl Scout Council in North Carolina have joined local Boy Scouts in sponsoring a youth leadership training conference in conservation.

Girl Scout Paulette Wallen of Vernon, Connecticut was appointed by Connecticut Governor John Dempsey to serve on his twelve-member Citizens Committee to Keep Connecticut Clean.

It can be said with certainty that the future will find Girl Scouts still working to secure a livable world by restoring, improving and protecting natural resources and the quality of the total environment.

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Program Department
9/67

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Dear Mr. White:

In letter of December 7, 1965, you invited us to submit comments on the Duke Power Company's contemplated use of water of the Keowee-Toxaway Project No. 2503 for cooling thermal generating plants. In view of the magnitude of the problems entailed, your Commission granted a 90-day extension with which to resolve these matters, including the ecology of fisheries and recreational features and to submit our findings.

Since the degree of thermal pollution bears close relationship with reservoir drawdown and resultant capacity it is desirable to include additional comments respecting this subject.

Studies made by the Department's Fish and Wildlife Service and the Bureau of Outdoor Recreation disclosed that the drawdown program as proposed by the Southeastern Power Administration would seriously impair and encumber the recreational features of the area.

In Duke Power Company's letter of December 14, 1965, it is noted that the company is agreeable to accepting in the license a stipulated operating agreement with Southeastern Power Administration for coordinating the Government's downstream hydroelectric plant operations. Extended studies relating to the two plans for reservoir drawdowns at the Jocassee and Keowee sites when viewed in the public interest substantiate the company's position concerning maximum drawdowns. The Department is agreeable that these stipulations be included in the license and that the Commission define the meaning of "maximum drawdown" and the assumptions entering into a proper determination of the drawdown.

Concerning the company's proposal for the construction of a 3000 MW nuclear generating plant in the project area, the Fish and Wildlife Service engaged a consultant of recognized authority on the subject of thermal pollution, who conducted an appraisal of heat transfer and water temperature change by computation of heat losses through evaporation, convection, and radiation and heat gains by solar radiation. Climatological data including temperature, wind, humidity, and solar radiation records are basic to the computations. Although the consultant's full report has not been completed, upon its receipt you will be provided with a copy. The comments that follow summarize the findings:

It is evident that forecasting of thermal conditions beyond the 3000 MW plant must be based on conditions obtained from the operation of the site "L" plant. Accordingly the current appraisal was limited to the 3000 MW steam electric production.

Computations of heat load were based on a 75 percent load factor or 7200 Btu/kwh. This is in agreement with the requirements for a pressurized water type nuclear reactor. A condenser water requirement of 3800 cfs producing a 19° temperature use was established.

The following tabulation summarizes the results of analyses of expected water temperature in the proposed Keowee Reservoir resulting from the 3000 MW atomic fuel steam electric plant at Site "L":

I. Considering Entire Keowee Reservoir Effective

1. Normal year - Normal climatology, hydrology and stage

Circulating condenser water	
Maximum intake temperature	81.8°F
Maximum discharge temperature	100.8°F
Seasonal peak monthly average intake	81.2°F

2. Critical year - Once 20-year severity

Circulating condenser water	
Maximum intake temperature	84.2°F
Maximum discharge temperature	103.2°F
Seasonal peak monthly average intake	84.2°F
Seasonal peak monthly average discharge	103.2°F

3. Critical year - (Basin completely mixed)

Maximum intake temperature	89.2°F
Maximum discharge temperature	108.2°F
Seasonal peak monthly average intake	88.7°F
Seasonal peak monthly average discharge	107.7°F

II. Consider one-half of Keowee Reservoir Effective

1. Critical year

Maximum intake temperature	91.2°F
Maximum discharge temperature	110.2°F
Seasonal peak monthly average intake	89.5°F
Seasonal peak monthly average discharge	108.5°F

The following surface distribution of condenser cooling water is expected under critical year, entire reservoir effective conditions:

1. 1000 acres from outlet - surface temperature 97°F
2. 2000 acres from outlet - surface temperature 93°F
3. 3000 acres from outlet - surface temperature 91°F

Vertical gradient of heated water will not extend 15 feet in depth at point of outlet and feather-edge to the surface elevation within the acre limits listed.

In consideration of the above findings, we conclude that the thermal effects of the Site "L" 3000 MW plant would produce no detrimental effects upon the fishery resources within the Lakes Jocassee or Keowee.

An intrusion of water temperatures within the 60-80°F range into the deeper zones of Keowee Reservoir will not be of sufficient duration annually to create a detriment to the lake fishery. Likewise, the surface heated acreages listed earlier will not constitute a fishery problem. The study findings indicate that there will be no adverse thermal effects from the Site "L" plant operation in Jocassee Reservoir.

Further, there is no evidence that waters discharged into Hartwell Reservoir will present a thermal problem affecting the fishery resource of that reservoir.

Because of the current inability to appraise the thermal effects beyond the Site "L" plant, the following stipulations should be made a part of the license:

> The licensee shall not initiate construction on Lakes Jocassee or Keowee of a steam-electric plant additional to the proposed 3000 MW plant at Site "L" without prior approval of the Federal Power Commission based on the recommendation of the Secretary of the Interior.
>
> The licensee will establish and carry out sufficient monitoring of the thermal effects of "Site L" plant operation and collection of climatological data necessary for the Secretary of the Interior to establish the thermal effects of steam-electric plants in addition to the Site "L" plant.

The above studies do substantiate the magnitude and seriousness of thermal effects which are possible with the use of steam of impoundment waters for condenser cooling. Likewise, the scope of the study undertaken indicates the degree of concern and future actions this Department feels it must undertake on matters of thermal pollution.

The Bureau of Outdoor Recreation advises that the plan of operation proposed by the company would provide a maximum drawdown of 30 feet for Jocassee Reservoir and 25 feet for Keowee Reservoir, while the Department's plan proposes maximum drawdowns of 36 feet and 44.5 feet respectively, including allowances for pumped storage.

We believe there would be no significant difference in the effects of the two plans of operation on outdoor recreation opportunities at the Jocassee Reservoir. Because of the size and topography of the area, the six-foot greater drawdown proposed by us would result in only minor differences in the water surface area and exposed drawdown zone that would obtain with the company's plan.

This would not be the case, however, at the Keowee Reservoir. The Department's proposed operation would result in a much greater reduction in water surface area of the reservoir and a correspondingly larger exposed drawdown zone than would the company's plan. If our drawdown recommendations were followed, all boat-launching ramps, swimming areas, water-access points, docks, and boathouses would have to be constructed or extended considerably beyond that required under the company's plan. Operation and maintenance costs of recreation facilities would be increased substantially. The additional strip of land, averaging 243 feet in width, which would be exposed under the Department's plan would also detract from the aesthetic and natural beauty qualities expected at the Keowee Reservoir. The outdoor recreation potential of the project could not be realized under such circumstances.

Both the proposals under consideration have incorporated minimum drawdown features during the period of May through September which is a primary concern to outdoor recreation. Data available on these annual drawdowns indicate that either plan would provide water-level control within acceptable limits during the summer recreation season. However, the outdoor recreation potential of the area would be limited by the levels of the reservoirs at the beginning of the recreation season.

Based upon analyses of available data, we conclude that the drawdown proposed in the company's plan of operation for the Keowee-Toxaway project would have less adverse impact on outdoor recreation opportunities than would the drawdown effects of the Department's plan of operation.

The Duke Power Company proposes to install an initial thermal generating plant of 3,000 MW capacity on the shore of Lake Keowee, and later, if demand warrants, to add an additional capacity of 4,000 MW. The company would take cooling water from Lake Keowee through low level intakes for their condenser and cooling systems, and discharge the water back into the lake.

The Department secured the services of a consultant to make a study to forecast thermal conditions within Lakes Keowee and Jocassee as well as possible effects on Hartwell Reservoir that would result from operation of a 3,000 MW plant in conjunction with the company's plan for operation of the reservoir. This study reveals that water discharged from the plant into Lake Keowee would be warmed to a temperature ranging from 16°F to 19°F above the temperature of the water obtained from the lake. We do not expect that this discharge would affect a sufficient amount of the surface acreage of the reservoir to be deleterious to the recreation resources.

The opportunity to provide our views on these aspects of the Keowee-Toxaway Project is appreciated.

Sincerely yours,

/s/ Stewart L. Udall
Secretary of the Interior

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Air & Water Quality Committee
Miss. Manufacturers Association
C/O B. C. Rogers & Sons
Morton, Mississippi 39117

Mr. J. R. Humpries, Jr., President
Standard Products, Inc.
P. O. Box 248
Moss Point, Mississippi 39563

Mr. Norman Lehonen, President
Pascagoula Junior Chamber of Commerce
213 Delmos Avenue
Pascagoula, Miss. 39567

Mrs. Zona Jelks, President
Mississippi Public Health Assn.
C/O Division of Public Health Nurses
State Board of Health
Box 1700
Jackson, Mississippi 39205

Dr. Robert F. Hutton, Executive Secretary
American Fisheries Society
1040 Washington Building
15th and New York Ave., N.W.
Washington, D. C. 20005

Mr. Sneed McInvale, President
Public Relations Association of Mississippi
Laurel, Mississippi 39440

Honorable Francis J. Hursey
Mayor of Pass Christian
Pass Christian, Mississippi 39571

Mr. Millard M. Bush, Director
Mississippi Agricultural & Industrial Board
1500 Woolfolk Building
Jackson, Mississippi 39205

Honorable C. L. Bullock
Mississippi House of Representatives
11 51st Street
Gulfport, Mississippi 39501

Mr. A. J. Buquet, Chairman
Canners Committee
Oyster Institute of North America
P. O. Box 909
Houma, Louisiana 70360

Mr. A. N. Cameron, District Chief
U. S. Geological Survey
Water Resources Division
164 Peachtree Seventh Building
Atlanta, Ga. 30323

Mr. C. Edward Carlson, Regional Director
Bureau of Sport Fisheries & Wildlife
809 Peachtree Seventh Bldg.
Atlanta, Ga. 30323

Honorable Nap L. Cassibry
Mississippi Senate
910 Wanda Place
Gulfport, Mississippi 39501

Mr. Vincint Castigliola, Director
Oyster Growers & Dealers Association
of Mississippi
P. O. Box 28
Pascagoula, Mississippi 39567

Mr. Frank Coogan
International Paper Co.
Mobile, Ala. 36280

Mr. Leland B. Cook, President
Mississippi Water Pollution Control
C/O Cook, Coggin, Kelly & Cook
Tupelo, Mississippi 38801

Mr. Joe Coulson, Director
Gulf States Marine Fisheries Commission
Room 225, 400 Royal Street
New Orleans, Louisiana 70130

Mr. Howard W. Chapman
Associate Regional Health Director
Environmental Health
DHEW, PHS, Region 10
50 Seventh Street, N.E.
Atlanta, Georgia 30323

Mr. William S. Chen, P.E.
Senior Engineer
Mechanical Section, Engrg. Dept.
The Quaker Oats Company
Merchandise Mart Plaza
Chicago, Illinois 60654

Mr. Frank Cochran, President
Mississippi Recreation Association
Meridian, Mississippi 39301

The Honorable William M. Colmer
U. S. Representative
Pascagoula, Mississippi

Miss Rosemary Crook, President
American Camping Association
625 St. Joseph Street
New Orleans, Louisiana 70130

Mr. Billy Joe Cross, Director
Mississippi Game & Fish Commission
402 High Street
Jackson, Mississippi 39216

Mr. A. F. Dantzler, Secretary
Pascagoula City Port Commission
Beach Boulevard
Pascagoula, Miss. 39567

Mr. Leslie Darden, President
Mississippi Economic Council
State Chamber of Commerce
P. O. Box 1849
Jackson, Mississippi 39205

Honorable Thomas J. Dickson
Mayor of Moss Point
Moss Point, Mississippi 39563

Mr. Jack Different, Executive Director
Gulf Regional Planning Commission
P. O. Box 265
Bay St. Louis, Mississippi 39520

Dr. Lloyd R. Robinson, Jr.
Department of Civil Engineering
Mississippi State University
State College, Mississippi

Mr. James M. Sharp
600 Farnsworth Avenue
Pascagoula, Mississippi

Mr. R. Leonard Davis, Manager
Quaker Oats Company
P. O. Box 525
Pascagoula, Miss. 39567

Miss Claire Davis, Executive Secretary
Rivers & Harbors Association of Mississippi
New Capitol Building
Jackson, Mississippi 39201

Mr. Charles Deaton, President
Mississippi Rivers & Harbors Assn.
Box 411
Greenwood, Mississippi 38930

Mr. John M. Rogers, President
Mississippi Manufacturers Association
c/o B. C. Rogers & Sons
Morton, Mississippi 39117

Represented by:
Mr. James Leker, Chairman
Air and Water Quality Committee
Mississippi Manufacturers Association
Morton, Mississippi
and
Mr. William M. Jones, Jr.

Mr. Swep Davis, Director
Pat Harrison Waterway District
Highway 49, South
Hattiesburg, Mississippi 39401

UNITED STATES
DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

December 14, 1967

DIRECTOR
SOUTHEAST REGION
SUITE 300
1421 PEACHTREE STREET N E
ATLANTA GEORGIA 30309

Dear

The Clean Water Restoration Act of 1966 directs the Department of the Interior to make a comprehensive study of pollution problems in the Nation's estuarine areas and to report to the Congress recommendations for a future management program. A copy of a booklet describing the study is enclosed.

The Act further directs that the Department invite the contributions of Federal, state, and local public bodies, institutions, private organizations and individuals. The study is designed to encourage contributions concerning the effects of pollution in the estuarine zones of the United States on fish and wildlife, sport and commercial fishing, recreation, water supply, water power, and on other beneficial uses.

The Federal Water Pollution Control Administration is responsible for carrying out the study. The Governor of each coastal State in the Southeast Region has designated a person to serve as the State contact to work with us in assuring that State interests are represented. In Mississippi, the Governor has appointed Mr. Robert S. Wright, Executive Secretary of the Mississippi Air and Water Pollution Control Commission.

You are invited to present a statement at a public meeting to be held on Wednesday, January 17, 1968, at the Broadwater Beach Hotel in Biloxi, Mississippi. The statement should express your opinions on optimum use of estuarine resources, their value, damages incurred due to estuarine pollution, and how the estuarine resources should be managed, and other items you feel appropriate to a consideration of the estuarine and coastal waters of Mississippi. Comments from State and Federal agencies are being obtained through direct contact from this office and will not be presented at this meeting. This meeting will start at 9:00 A.M. and a verbatim transcript will be taken.

The following guides will be used in conducting the meeting:

1. The meeting is open to all interested groups, organizations, or to individuals having an interest in the problems of estuaries.

2. Persons desiring to present statements for the record should advise us by January 8, 1968. Formal statements should be sent to the Director, Technical Programs, Southeast Water Laboratory, Federal Water Pollution Control Administration, Athens, Georgia 30601. A registration desk will be maintained at the meeting and any persons wishing to present statements, who have not previously done so, should make their desire known at that time. Priority for making statements at the meeting will be given to those persons submitting statements or requests prior to January 8.

3. Limitations on lengths of statements will not be made unless it is necessary to do so in order to accommodate all those wishing to appear. Participants are encouraged to make their statements concise and as brief as possible. It is suggested that lengthy statements be filed in writing for inclusion in the record of the meeting with a summary of the statement presented orally.

4. Written statements are not required although participants are encouraged to do so.

5. Statements should be as factual as possible and based upon the subjects of estuarine pollution and effects therefrom.

6. Persons desiring to use visual aids such as slides, charts, etc. should make their own arrangements for necessary equipment. A screen for projection will be available.

7. The meeting record will be held open for a period of fifteen calendar days within which written statements or supplements to statements presented at the hearing will be received.

Any questions you may have can be directed to me or to the Director of Technical Programs at the Southeast Water Laboratory. I look forward to your participation in this important endeavor.

Sincerely yours,

John R. Thoman
Regional Director

UNITED STATES
DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

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SOUTHEAST REGION
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ATLANTA, GEORGIA 30309

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John R. Thoman
Regional Director

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UNITED STATES
DEPARTMENT OF THE INTERIOR
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ATLANTA, GEORGIA 30309

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The Clean Water Restoration Act of 1966 directs the Department of the Interior to make a comprehensive study of pollution problems in the Nation's estuarine areas and to report to the Congress recommendations for a future management program. The Act further directs that the Department invite the contributions of Federal, state and local public bodies, institutions, private organizations and individuals. The Federal Water Pollution Control Administration is responsible for carrying out the study.

Information for the Study is being obtained from State and Federal agencies by direct contact through appointed agency designees. Information from institutions, private organizations and individuals is being obtained through the mechanism of public meetings to be held in each coastal state. In Mississippi, the Governor has appointed Mr. Robert S. Wright, Executive Secretary of the Mississippi Air and Water Pollution Control Commission, as the State designee to coordinate Mississippi interests in the Study.

In connection with the Study, a public meeting will be held on January 17, 1968, at the Broadwater Beach Hotel in Biloxi, Mississippi. We have invited persons representing associations, user groups, and other interested individuals to present statements expressing their opinions on optimum use of estuarine resources, their value, damages incurred due to estuarine pollution, and how the estuarine resources should be managed, and other items they deem appropriate to a consideration of the estuarine and coastal waters of Mississippi.

State agency views regarding the Study are being coordinated through Mr. Wright's Office, thus, statements from State agencies are not being requested for this meeting. However, if you wish to have a representative of your agency attend, please feel free to do so. The meeting will start at 9:00 A.M. and a verbatim transcript will be taken. Any questions on this subject can be directed to me or to Mr. Wright.

Sincerely yours,

John R. Thoman
Regional Director

UNITED STATES
DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

DIRECTOR
SOUTHEAST REGION
SUITE 300
1421 PEACHTREE STREET N.E.
ATLANTA, GEORGIA 30309

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The Clean Water Restoration Act of 1966 directs the Department of the Interior to make a comprehensive study of pollution problems in the Nation's estuarine areas and to report to the Congress recommendations for a future management program. The Act further directs that the Department invite the contributions of Federal, state, and local public bodies, institutions, private organizations and individuals. The Federal Water Pollution Control Administration is responsible for carrying out the Study.

Information for the Study is being obtained from State and Federal agencies by direct contact through agency designees. Information from institutions, private organizations and individuals is being obtained through the mechanism of public meetings to be held in each coastal state. It is understood that Federal agencies with interests in estuarine management have designated persons to work with the FWPCA on the Study.

In connection with the Study, a public meeting will be held on January 17, 1968, at the Broadwater Beach Hotel in Biloxi, Mississippi. We have invited persons representing associations, user groups, and other interested individuals to present statements expressing their opinions on optimum use of estuarine resources, their value, damages incurred due to estuarine pollution, and how the estuarine resources should be managed, and other items they deem appropriate to a consideration of the estuarine and coastal waters of Mississippi.

As Federal agency views regarding the Study are being coordinated by us through the individual Federal agency designees, statements from Federal agencies are not being requested for this meeting. However, if you wish to have a representative of your agency attend, please feel free to do so. The meeting will start at 9:00 A.M. and a verbatim transcript will be taken. Any questions on this subject can be directed to me or to Mr. Paul Traina, Director, Technical Programs, Southeast Water Laboratory, Athens, Georgia 30601.

Sincerely yours,

John R. Thoman
Regional Director

Dr. Walter Abbott
Gulf Coast Research Laboratory
Ocean Springs, Miss.

Mr. George W. Allen
U.S. Corps of Engineers
Mobile, Alabama

Mr. R. L. Avera
Humble Oil & Refining Co.
New Orleans, La.

Mr. Arthur N. Beck
Technical Secretary
Alabama Water Improvement Commission
State Department of Health
Montgomery, Ala.

Mr. Richard T. Bennett
Gulf Coast Research Laboratory
Ocean Springs, Miss.

Mr. H. H. Bell, Jr.
Mississippi Power Company
Gulfport, Miss.

Mr. C. A. Brady
International Paper Co.
Moss Point, Miss.

Mr. Joe D. Brown
Miss. Board of Health
Jackson, Miss.

Mr. Jorge E. Burguet
Miss. Power & Light Co.
Biloxi, Miss.

Mr. Victor L. Casper
Gulf Coast Marine Health Sciences Lab.
Dauphin Island, Ala.

Mr. Larry Canter
DeFraites Associates
New Orleans, La.

Mr. Frank Carroll
Fish & Wildlife
Biloxi, Miss.

Mr. William S. Chen
The Quacker Oats Co.
Chicago, Illinois

Mr. Joseph V. Colson
Gulf States Marine Fisheries Comm.
New Orleans, La.

Mr. Don M. Conlon
U. S. Corps of Engineers
Mobile, Ala.

Mr. David W. Cook
Gulf Coast Research Lab.
Ocean Springs, Miss.

Mr. Swep Davis
Pat Harrison Waterway District
Hattiesburg, Miss.

Mr. Arthur A. DeFraites
DeFraites Associates
Biloxi, Miss.

Mr. Jack Different
Gulf Regional Planning Comm.
Bay St. Louis, Miss.

Mr. Albert Duckett
Biloxi Port Commission
Biloxi, Miss.

Mr. Richard Duty
FWPCA - Ada ~~[illegible]~~, Oklahoma

Mr. John N. Dyer
Crown Zellerbach Corp.
Bogalusa, La.

Mr. Marvin S. Dyess, Jr.
Miss. State Board of Health
Gulfport, Miss

Mr. Louis Fondren
Miss. Gulf Coast Seafood Assn.
Moss Point, Miss.

Mr. Harriman Ford
DeFraites Associates
Biloxi, Miss.

Mr. Louis Fortenberry
Coastal Chemical Corp.
Pascagoula, Miss.

Mr. Jack L. Gaines
Gulf Coast Marine Health Lab
Dauphin Island, Ala.

Mr. Herb Gadberry
Miss. Boat & Water Safety Comm.
Biloxi, Miss.

Mr. William C. Galegar
Regional Director
FWPCA - Dallas

Mr. Thomas J. Gilbert
Louisiana Stream Control Comm.
Baton Rouge, La.

Mr. Joseph K. Glascock
Harrison County Development Comm.
Gulfport, Miss.

Mrs. Louis J. Gutierrez
Private Citizen
Biloxi, Miss.

Mr. John Hagan, [illegible]
[illegible]

Mr. George H. Hamanal
H. K. Porter Co., Inc.
Pascagoula, Miss.

Mr. Richard J. Hammerstrom
Gulf Coast Marine Health Sciences Lab.
Dauphin Island, Ala.

Mr. Dennis R. Hazelton
8th Coast Guard District
New Orleans, La.

Mr. Dudley B. Heiliger
WLOX - TV
Gulfport, Miss.

Mr. Eugene Jensen
Headquarters [illegible]

Mr. W. M. Jones, Jr.
Miss. Manufacturers Assn.
Jackson, Miss.

Mr. Joe W. Lang
U.S. Geological Survey
Jackson, Miss.

Mr. James E. Leker
MMA Air & Water Quality Comm.
Laurel, Miss.

Mr. Murry Lucky
Miss. Power Co.
Gulfport, Miss.

Mr. James T. Lytal
Chemical Waste Disposal Co., Inc.
Lockport, La.

Mr. Hugh A. McClellan
University of Alabama
Marine Sciences Institute
Bayou La Batre, Ala.

Mr. Bruce N. Maghan
Jackson Co. Sportsman's Assn.
Gautior, Miss.

Mr. Jimmie D. Mills
Tombigbee River Valley Water Mngmt. Dist
Tupelo, Miss.

Mr. Terry D. Monk
Thiokol Chemical Corp.
Moss Point, Miss.

Mr. William B. Moorer
Miss. State Board of Health
Gulfport, Miss.

Mr. Jeff Napier
Outboard Boating Club Of America
Chicago, Ill.

Mr. James H. Neeld, III
Miss. Chemical Corp - Coastal Chemical
Yazoo City, Miss.

Mr. N. E. Pentz
The Quaker Oats Co.
Chicago, Ill.

Mr. Claude Ramsey
Miss. AFL-CIO
Jackson, Miss.

Mr. Louis Rash
City of Biloxi - City Hall
Biloxi, Miss.

Mr. Edward G. Roberts
The Nature Conservansy
State College, Miss.

Mr. W. V. Robertson
Miss. Wildlife Federation
Gulfport, Miss.

Dr. Lloyd R. Robinson, Jr.
Miss. State University
State College, Miss.

Dr. George A. Rounsefell
Marine Sciences Institute
University of Alabama
Bayou La Batre, Ala.

Mr. W. L. Siler
Gulf Coast Research Lab.
Ocean Springs, Miss.

Mr. Harry Schaffer
La. Wildlife & Fisheries
New Orleans, La.

Mr. D. E. Schneible
U.S. Dept. of Transportation
Atlanta, Ga.

Mr. Sidney Sebren
Coastal Chemical Corp.
Miss. Chemical Corp.
Yazoo City, Miss.

Mrs. Francis Sirjane
League of Women Voters
Vicksburg, Miss.

Mrs. Dolores Davidson Smith
Davidson Realty
Ocean Springs, Miss.

Mr. James H. Stovall
International Paper Co.
Mobile, Ala.

Mr. Albert H. Story
USPHS, Dauphin Island, Ala.

Mr. Ralph Tatum
Miss. Boat & Water Safety Comm.
Jackson, Miss.

Mr. J. F. Turner, Jr.
International Paper Co.
Moss Point, Miss.

Mr. James V. Walters
International Paper Co.
Tuscaloosa, Ala.

Mr. E. L. Webb
Thiokol Chemical Corp.
Moss Point, Miss.

Mr. Ben F. Wimberly
1st National Bank
Biloxi, Miss.

Miss Margaret Wimberly
junior high school student
Biloxi, Miss.

Mr. Glen Wood, Jr.
Miss. Air & Water Pollution Control Com
Jackson, Miss.